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FM 17-70

DEPARTMENT OF THE ARMY FIELD MANUAL

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COMMUNICATION FOR ARMOR UNITS

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HEADQUARTERS, DEPARTMENT OF THE ARMY

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FIELD MANUAL
No. 17-70

HEADQUARTERS,
DEPARTMENT OF THE ARMY
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COMMUNICATION FOR ARMOR UNITS

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CHAPTER 1
GENERAL

Section I. GENERAL

1. Purpose and Scope

This manual is a guide for commanders, staff officers, and personnel concerned with communication in armor units. The purpose is to provide in a detailed but nontechnical explanation the basic knowledge required in the application and employment of efficient armor communication system.

2. Applicability

a. Except where otherwise specified, this manual is equally applicable to nuclear or to nonnuclear warfare.

b. This manual should be used in conjunction with applicable field manuals and technical manuals. Appropriate references are indicated throughout this manual and in appendix I.

c. Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to U.S. Army Armor School.

3. The Mission of Communication

On any battlefield a unit may be successful only to the degree that the commander can communicate with his subordinates and with higher headquarters in transmitting and receiving plans, orders, and information. Communication provides a commander with the capability of increasing his span of control and facilitates effective use of the elements available for combat and support.

4. Command Responsibility

a. General.

(1) The armor commander at each level is responsible for the organization, installation, and operation of his own unit's communication system and for its efficient operation as a part of the system of the next higher command.

(2) Responsibility for establishing, maintaining and enforcing effective continuous communication in conformance with the policies of the next higher commander rests directly on the unit commander.

b. Responsibilites.

(1) *General.* In armor organizations communication specialists are available to provide assistance and advice to the commander in technical and nontechnical communication matters. The larger the scope of a command the greater the need for technical assistance, and it follows that as the scope of command grows, increased support is required. The information in (2) through (7) below is intended to acquaint commanders with specific details of communication responsibility and to direct their attention to the technical assistance provided each commander by his organic communication specialists and by the specialists of the next higher headquarters.

(2) *Communication security.* Communication security is essential to any communication system if we are to deny the enemy knowledge of our intentions, plans, strengths, and weaknesses. Details of communication security are contained in paragraphs 16 through 19.

(3) *Communication procedure.* Communication procedure, whether it pertains to the use of radio or supplemental means of communication, has a direct bearing on the efficiency and effectiveness of a system. The speed and security of a given means of communication will be materially aided by the employment of proper procedure and by elimination of nonessential traffic.

(4) *Communication planning.* In communication planning the fact that no communication system exists as a complete, separate entity must be recognized. Consideration must be given to coverage of the communication system and to providing all persons and units with required communication. Also, alternate means of communication must be planned to prevent or alleviate any emergencies. Principles of planning discussed in other field manuals are equally applicable to communication planning.

(5) *Communication training.* Communication training requires emphasis by the commander to prepare an efficient, accurate, and reliable communication system. Fulfilling this part of a commander's responsibility facilitates accomplishment of his other communication responsibilities. Although formal training is not the sole answer, when such training is coupled with integrated communication training, the product will be an effective system.

(6) *Communication discipline.* Communication discipline is the attitude of individuals that insures proper applica-

tion of communication procedures and techniques. The commander achieves communication discipline by intelligent leadership, effective training, and enforcement of correct operational and security procedures. This discipline must be instilled in all users to the point that they will take correct action in the absence of orders.

(7) *Communication supply and maintenance.* Communication supply and maintenance are basic responsibilities that no commander may overlook. He must procure authorized and required equipment, and insure effective, continuous, and reliable communication by placing emphasis on supply and maintenance, including facilities and supervision.

5. Principles of Armor Communication

a. General. For the purpose of stating guidelines in the achievement of a fast, secure, and reliable communication system, basic armor communication principles are outlined in *b* through *l* below.

b. Command Responsibility. Command responsibility (par. 4) is the guiding principle of armor communication.

c. Higher to Lower. Communication between higher and subordinate units is the responsibility of the higher headquarters.

d. Attached Units. An attached unit enters the communication system of the unit to which attached and severs communication with its own parent organization. For communication purposes the attached unit then comes under control of the organization to which attached, and the higher to lower rule (*c* above) applies.

e. Supporting Units. A supporting unit establishes communication with the unit it is supporting and also maintains communication with its own parent organization.

f. Adjacent Units. Communication between adjacent units is established from left to right, or as specified by the next higher commander.

g. Units in Column. Communication between units in column is established from tail to head, in the direction of movement, or as specified by the next higher commander.

h. During Movement. Communication must be maintained during movements.

i. Disrupted Communication. If communication is lost or disrupted between units, each unit involved is responsible for taking immediate action to restore communication.

j. Succession of Communication Control. When a major headquarters is destroyed, succession of communication control will be as established by unit standing operating procedure (SOP).

k. Communication Support. Communication support is provided by higher headquarters to subordinate elements. The responsibility for supply is from the higher organization to lower unit.

l. Integration. Each communication system must be integrated into adjacent, higher, and lower systems, with compatibility provided where the systems join. In addition, this principle implies that interference between systems must be eliminated or held to a minimum by proper and well-planned frequency and equipment assignment.

6. Duties of Communication Personnel

a. General. TOE from the highest echelon down to company, battery, and troop level authorize technically qualified personnel whose primary duties are to install, operate, and maintain communication systems. This authorization does not relieve any commander of his responsibility for communication, it rather increases his capability for accomplishing this responsibility. The majority of personnel in a tank company use FM radios during normal operations. These FM radio users are not considered communication personnel, but they too must be trained in communication duties and responsibilities.

b. Duties.

(1) An outline of duties for communication personnel is found in the following publications for:

(*a*) Signal/communication officers: FM 11–16 and FM 101–5.

(*b*) Communication personnel: FM 11–17 and AR 611–201 (MOS guide).

(2) The following are duties of signal/communication officers in armor units:

(*a*) Provide technical assistance relating to signal activities and advise the commander and staff on communication matters, including security, facilities, maintenance, location and organization of the command post for efficient communication operation, and plans and policies affecting communication matters.

(*b*) Coordinate and exercise control as required of signal or communication troops assigned, attached, or in support.

(*c*) Plan and supervise the communication system in coordination with the appropriate staff officer. Planning and supervision include preparation of the unit SOP, standing signal instructions (SSI), signal operation instructions (SOI) (or extracts), and the signal portion of operation orders; coordination of signal matters

affecting training and operations of all types; and any special signal communication requirements.

(*d*) Coordinate signal matters with representatives of both higher headquarters and subordinate elements to insure efficient operation and use of the communication system.

(*e*) Plan, supervise, and conduct schools when required for training of communication personnel.

(*f*) Plan, supervise, and coordinate communication security. This includes use, procurement, storage, and distribution of codes, ciphers, and crypotographic material.

(*g*) Plan, supervise, and coordinate matters pertaining to signal supply and maintenance.

(*h*) Provide briefings to commanders and staff officers on communication matters as required.

c. Staff Relationship.

(1) Before the signal/communication officer can attempt to fulfill his duties as described above, he must be fully aware of the operational situation confronting his organization. This information is obtained by maintaining liaison with staff members of the units involved and by conferences with commanders and their staffs.

(2) To provide efficient and timely support, the signal/communication officer must be prepared to discuss the capabilities and limitations of his own communication system and that of higher headquarters. This discussion must include immediate requirements and those required for future operations. It may include such varied items as use of the area communication system, technical intelligence, photography, frequency allocations, routes and axes of communication, availability of trained communication personnel, and status of electronic warfare.

Section II. MEANS OF COMMUNICATION

7. General

Any method or medium used to transmit information from one person or place to another is a means of communication. In armor units multiple means of communications are used—radio, wire, messenger, sound, and visual. Allocation of equipment and personnel to employ these means is determined by the use and importance of each means to a particular unit. Armor units employ radio as the primary means of communication, but any means to provide effective communication may be used as decided by the

commander. Reliability is a prime objective of any communication system. Because no one means of communication is completely reliable by itself, all means must be employed habitually to supplement and complement each other to provide the desired degree of reliability. Other important objectives of the communication system include speed, flexibility, and security.

8. Radio

a. General.

(1) In armor units radio, because of its inherent speed and flexibility, is the primary means of communication. Flexibility in armor units means that:

(*a*) Radio is completely mobile.

(*b*) Once installed, radio is ready for use and does not require reinstallation.

(*c*) Radio lends itself to many modes of operation, such as voice, radioteletypewriter (RATT), radiotelegraph, visual presentations, and wire integration.

(*d*) Radio is readily used by aerial, amphibious, vehicular, and dismounted units.

(*e*) Natural obstacles, minefields, and terrain under enemy control or fire do not limit radio to the same extent that they limit other means of communication.

(2) Radios used by armor units include frequency-modulated (FM) radios for short range communication and amplitude-modulated (AM) radios for long range communication. The distance over which a radio is normally expected to operate reliably is known as the planning range.

b. Limitations.

(1) Radio is subject to equipment breakdown, to interference from atmospheric conditions, and to radiation from other electronic devices.

(2) To be capable of operating together, radios must have common or overlapping frequencies, they must transmit and receive the same type signal, and they must be located within operating range.

(3) Virtually all members of armor units are considered radio operators, and must be trained in radio operation and user maintenance.

(4) Radio is the least secure of all means of communication; therefore it must be assumed that every transmission is monitored by the enemy.

(5) Radio is limited, in that only one station can make a transmission on a given frequency at a given time.

c. Short Range (FM) Radio.

(1) Man-pack portable, lightweight, short range, FM equipment is available throughout armor units for dismounted voice communications. The planning range for the smallest portable radio used is 1 mile, while larger "backpack" portables will operate up to 5 miles with a standard antenna and up to 12 miles with special antennas.

(2) Vehicular-mounted FM radios are used at all levels. These radios are installed in all types of vehicles and are commonly known as the standard series FM radios. Planning ranges for these radios vary from 10 to 15 miles moving, and up to 35 miles stationary (using special antennas). These radios are composed of basic components that may be combined in various configurations to provide capabilities needed at various levels of command. Added capabilities may be obtained from these basic components by use of auxiliary equipment provided by TOE.

d. Medium and Long Range (AM) Radios. Vehicular-mounted AM radios furnish armor units with the extended communication ranges needed during highly mobile and widely dispersed operations. Primarily these radios are used for communication at battalion level and higher; however, they are also employed in separate companies such as the aviation company and the armored cavalry troop. Planning ranges for medium power AM radios start at 50 miles for voice operation, and for high power sets at 250 miles. The AM radio provides armor units with such capabilities as radiotelegraph (CW) and radioteletypewriter (RATT). While all personnel in armor are considered capable of operating FM equipment, AM equipment requires specially trained operators who are provided for in appropriate TOE.

e. Special Application of Radio.

(1) *FM radio.* Auxiliary equipment allows FM radio the additional capabilities required in armor operations. The more important additional applications of FM equipment include radio-wire integration, remote operation, automatic retransmission, and a homing capability. For details see FM 24–18 and appropriate technical manuals.

(2) *AM radio.* AM radio may be integrated into wire and FM radio systems when auxiliary equipment is available. AM radios operating in the ultrahigh frequency range (UHF) are used for communication with tactical aircraft.

9. Wire

a. General. Wire as a supplemental means of communication provides telephone and, in some cases, teletypewriter (TT) communication during both semimobile and static situations. It is available to armor units at all levels and, once installed, provides fast and reliable communication. While wire is more secure than radio, the transmission of classified messages in the clear over these circuits will be done only when the urgency of the tactical situation dictates. In order to provide contact between distant elements where the use of wire is not feasible, wire is often tied into radio stations. The distance over which wire communication may be used depends on the type of equipment in use and the condition of the wire between equipment. The limitations in use of wire are that wire requires greater time than other systems to install and it cannot be used on the move.

b. Equipment.

(1) *Wire.* Field wire systems are used at all levels. However, higher echelon signal units employ field cable to link local switchboards and portions of the area communication system.

(2) *Wire laying and recovery equipment.* Spool-type reels are used to store, transport, lay, and recover field wire or cable. Canvas containers of coiled field wire also may be used to lay field wire. Wire laying equipment is made in various types and sizes for operation under varying conditions. Wire laying and recovery equipment is issued to armor units according to the need and use of wire systems in the unit. When high speed installation is desired, aircraft may be used to lay wire, using the canvas wire dispensers.

(3) *Field telephones.* Field telephones are portable, self-contained sets designed for use in the field. These sets are issued to armor units according to the length and type of circuits and the type of switchboard used. Field telephones include sound-powered sets, battery-powered sets for short range use, and battery-powered amplifying sets for long range use.

(4) *Switchboards.* Throughout armor units manual switchboards are employed to increase the flexibility of wire systems by connecting subscribers to a central point. From this central point, access may be established to other switchboards and to FM radio from field telephones, and may be gained to the area communication system.

(5) *Teletypewriters (TT).* A teletypewriter is a machine for transmission and reception of electrical impulses that are converted into a recorded message. When appropriate ancillary equipment is available teletypewriters may be used simulaneously with voice on wire circuits, and are available down to combat command. When required by higher headquarters the teletypewriter portion of radioteletypewriter equipment may be used in nonradioteletypewriter circuits. The teletypewriter may be operated over field wire, cable, radio, radio relay, and carrier systems. Long reports may be transmitted with this equipment at the rate of about 60–100 words per minute. On field wire, teletypewriters have a planning range of about 25 miles.

c. Considerations. More time is required to install wire lines than is required to install other armor communication systems. The time necessary for installation is dependent on distance involved, the method of laying wire, the number and state of training of personnel available, terrain and weather, and the routes selected. A decision as to whether wire communication is to be installed must be based on these factors and on the availability of wire, equipment, future needs, and the tactical situation. Installation time can be reduced by effective planning and training. For details see FM 24–20.

10. Messenger

a. General. The messenger is the most secure means of communication. Armor units employ all types, including dismounted, motor, and air messengers. These messengers usually operate on a regular schedule, established by SOP, and they provide special delivery when required. Messenger service is the primary means of communication available to armor units for transmitting bulky items such as maps, documents, and photographs. Although any member of a unit may be used as a messenger, efficiency of the system depends greatly on the training, ability, and reliability of the individual messenger.

b. Considerations.

(1) Messengers must be briefed on routes to be used, rate of travel, location of receipt and delivery points, and the situation along the route if applicable.

(2) Because thorough knowledge of the location and route to a receipt and delivery point is not always available, the individual messenger must be proficient in map reading. When possible, routes used by messengers during periods of limited visibility should be reconnoitered during daylight.

(3) When the security of a message and the enemy situation dictate special handling, two or more messengers may be dispatched over multiple routes.

c. Liaison. For normal coordination between armor units, extensive use is made of liaison personnel. Liaison provides the commander with a means to facilitate the rapid coordination and flow of plans and information with higher and adjacent units. When specific liaison personnel are not authorized the commander may select personnel for this purpose. Liaison personnel should be available to all staff sections. They must not be used for routine matters which are normally handled by messenger service.

11. Sound

Sound is a rapid means of transmitting information short distances using simple equipment such as horns, whistles, gongs, weapons, or any other available noise-making device. However, effectiveness in use of sound signals may be reduced by tracked vehicle traffic or battle sounds, and in some cases noise may disclose friendly positions. Simple prearranged meanings for sound signals are assigned in the unit SOP, the current signal operation instruction (SOI), or in the signal portion of the operation order.

12. Visual

a. General. Visual signals are used particularly at squad, platoon, and company level. Messages are transmitted using arm and hand signals, flags, lights, pyrotechnics, smoke, weapons, panels, and techniques such as aircraft maneuvers. Visual signals provide a rapid means of communication; however, the following factors must be considered in their use:

(1) Meanings must be prearranged, understood, and practiced by all users.
(2) Range of visual signals are limited to visibility.
(3) Visual signals generally lack security.
(4) Visual signals are easily misunderstood, especially when combinations of signals are employed.
(5) The enemy may use similar signals for deception and to create confusion.

b. Employment.

(1) Arm and hand signals are used primarily for control of vehicles and personnel both tactically and administratively.
(2) Flags are used in armor as extensions of arm and hand signals to provide greater range, and signal lights are used for better visibility at night. Special uses are also assigned these modes of visual communication, such as

the use of flags to indicate the progress of firing on tank ranges.

(3) Weapons and pyrotechnics (and combinations) are particularly well adapted for tactical employment, but the effectiveness of these signals may be reduced by an enemy who uses similar signals.

(4) Two general types of signaling are accomplished with panels. Positions are marked and friendly units, vehicles, and front lines are identified by use of marking and identifying panels of bright fluorescent colors. Simple messages are transmitted in ground-to-air signaling by use of sets of black and white panels.

(5) Units should be encouraged not only to use and practice these standard signals but to develop signals to fit the needs of the unit. To insure proper use and understanding, duplication of the standard signals must be avoided, and the use of special signals and meanings must be controlled at the highest level practicable (FM 21–60).

Section III. COMMUNICATION PLATOONS

13. General

Certain armor units are authorized organic communication platoons to operate portions of the communication system. At battalion and squadron level, the communication platoon leader is the communication staff officer; at combat command, armor group, and armored cavalry regiment levels both a communication staff officer and a communication platoon leader are authorized. This organic communication support provides armor commands with the flexible communication system required for highly mobile operations.

14. Mission

The primary mission of the communication platoon is to install and operate major parts of the unit communication system (par. 15) and perform organizational maintenance on communication and other electronic equipment. Communication platoons of specific units are discussed in appropriate chapters.

15. Services

The communication platoon—

a. Supervises the operation of the internal communication system of the organization to which it is organic.

b. Installs, operates, and maintains the wire communication system in the command headquarters and, when necessary, to subordinate elements.

c. Operates ground-to-air visual communication in the command post and trains area.

d. Operates and maintains AM radios in the unit headquarters elements.

e. Provides message center services, including messengers, encrypting and decrypting of messages, and maintenance of communication files, records, and reports.

f. Within established limitations, provides second-echelon maintenance of communication and other electronic equipment.

g. Prepares, maintains, and distributes signal orders, instructions, and SOI extracts.

Section IV. COMMUNICATION SECURITY

16. General

Communication security is the protection resulting from all measures taken to prevent or delay the enemy's obtaining information of military value from our communication sources. The commander determines the degree of communication security required in a given situation. Security includes physical, cryptographic, and transmission security. Communication security orders and regulations must be understood and practiced by everyone concerned with communication. In the choice of a communication means, requirements for both security and speed must be considered. The commander may authorize transmission of a message in the clear when prompt action is called for, when the urgency of a message outweighs the value of the information gained by the enemy, or when the enemy will have insufficient time to react to the information.

17. Physical Security

Physical security is the physical safeguarding of communication equipment and documents. Safeguarding measures include the following:

a. Distribution of critical items such as SOI's and SSI's (and extracts thereof) is on a need-to-know basis.

b. Complete SOI's are not taken forward of front line battalion command posts.

c. Before a command post is vacated, it is inspected for messages, carbons, and copies of maps or orders left behind.

d. Loss of SOI's or cryptomaterials must be reported promptly to the next higher command.

e. Personnel must be trained in the methods of destroying classified equipment and documents.

f. Classified equipment and documents must be safeguarded in accordance with AR 380–5 and AR 380–40.

18. Cryptographic Security

Cryptographic security is the provision and use of adequate, technically sound cryptographic systems. Strict observance of cryptographic operating instructions is essential to reduce the effectiveness of the enemy's communication intelligence effort. Time spent in encrypting gives a high return in security. Modern cryptographic systems are used to encrypt and decrypt written messages, providing security with reasonable speed. Cryptographic equipment is available for use with radioteletype systems to provide automatic enciphering and deciphering. Armor units rely on voice radio communication during periods of rapid displacement, and therefore use simple operational codes which, by their nature, do not provide the high degree of long-time security provided by cryptosystems.

19. Transmission Security

a. General. Transmission security includes all measures and practices designed to protect friendly transmissions from interception and traffic analysis by the enemy. All known methods of electrical communication are liable to interception. Of particular importance to armor units is the lack of security occasioned by extensive use of radio and, to a degree, wire. A thorough study by the enemy of *externals*—networks, call signs, frequencies, volume, length, operator chatter—allows enemy trained traffic analysts to obtain an amazing amount of information concerning order of battle, state of training, capabilities, and future plans. All personnel concerned with communication must be aware of the need for security and trained to practice it.

b. Application of Transmission Security Measures.

(1) Radiotelephone procedure and, particularly, use of call signs and frequencies must be carefully observed.

(2) All personnel, from the tank crewman and armored rifleman to the most senior commander, must practice transmission security.

(3) All tactical elements must be trained in the use of supplemental means of communication and encouraged in minimum use, when possible, of radio. However, care must be exercised to maintain an established traffic pattern when a unit engaged in one operation is changing to a different operation.

(4) The decision of the commander to use clear text or code at unit level will depend on the enemy reaction time and the tactical situation. *If the time required for friendly action is shorter than that required for enemy reaction, use clear text; otherwise, use code.*

(5) All personnel should be trained to preplan transmissions and, when feasible, write out the message prior to transmission.

(6) Use of messenger service for classified and routine matters should be encouraged. All messenger activities must be organized and supervised to provide fast and efficient message handling service.

c. Radio Silence. Radio silence is a period during which all or certain radio equipment is kept inoperative. Specific details on restricted use of radios is determined by the headquarters issuing the order for radio silence. For instance, certain radios may be authorized to net and transmit flash, emergency, and operational immediate messages, or designated radios may be required to maintain a listening watch with transmitters off and receivers on.

Section V. ELECTRONIC WARFARE

20. General

a. Electronic warfare (EW) includes actions taken to prevent or reduce an enemy's effective use of electronic devices and techniques while insuring our own effective use of these devices and techniques.

b. Armor units depend on radio and a variety of other electronic devices for the conduct of operations; therefore, members of armor units must be familiar with certain aspects of EW. These aspects of EW include knowledge of the implication of jamming (from both the friendly and enemy standpoints) and the implication of electronic devices as a source of intelligence information (par. 19). Commanders are responsible for employment of electronic warfare units assigned or attached to their commands, for integration of EW missions into their overall tactical operations (ch. 8, FM 100–1). The importance of EW support to tactical commanders will continue to increase as armor develops and receives more electronic equipment. For a discussion of EW units and their employment, see FM 24–150.

21. Employment

a. Planning.

(1) Plans for use of EW must provide for minimum interference to friendly electronic systems while simultaneously causing maximum disruption to enemy systems.

(2) Coordination must be stressed at all echelons of command to prevent interference with tactical operations.

(3) Plans must include the use of alternate means of communications when jamming is encountered.

b. Training.

(1) Commanders and staffs must be familiar with the concepts for effective coordination and employment of EW support and with its capabilities and limitations.

(2) Training must include defense against EW, with emphasis on antijamming techniques. For details of techniques, see FM 24–18 and FM 24–150.

(3) Because tactical employment of armor units is difficult when radio is disrupted by electronic warfare, training exercises must emphasize effective employment of supplemental means of communication. Use of supplemental means of communication must be planned and executed in an orderly fashion and with a minimum of delay. Employment of standing operating procedures established and practiced during training is essential.

(4) Units must be trained to operate and maintain communication in an electronic countermeasure (ECM) environment.

c. Support.

(1) The division signal officer and the communication officers at other levels provide commanders with technical advice and assistance in dealing with electronic warfare problems. The division signal officer has special staff responsibility for coordination of all division electronic warfare activities.

(2) The U.S. Army Security Agency (ASA) provides both liaison and support to elements of the division. ASA support includes a section with a capability of determining the degree of security maintained by the entire division communication system.

(3) One combat electronic warfare signal company is normally attached to the division from higher headquarters. This unit provides both liaison and support for electronic warfare activities, and coordinates missions of both the ASA and the signal units with all personnel concerned.

CHAPTER 2

TACTICAL COMMUNICATION

Section I. GENERAL

22. General

a. Employment of armor units emphasizes dispersion, flexibility, and mobility of elements on a nuclear or nonnuclear battlefield, which, in turn, require a fast, secure, and reliable communication system. This system must be applicable to any tactical situation and capable of quick reaction to meet changes in operational plans and effects resulting from nuclear strikes.

b. To effectively integrate communication into tactical operations, commanders and communication personnel must have a thorough knowledge of the communication equipment, means, procedure, and available personnel. Commanders must require the proper application of communication principles and security at all times, and all personnel must be capable of selecting the means of communication that best accomplish the assigned mission.

23. Planning

a. General. The success of communication depends on timely and adequate planning, which must be continuously revised to meet changing situations. Communication details must be coordinated with superior, subordinate, supporting, supported, and adjacent units. With prior planning by the commander and his staff, the flexible communication system employed by armor units is capable of supporting operations in any terrain or weather.

b. Considerations.

(1) Communication personnel must be informed of the current operational situation, while the commander and his staff must be informed of the communication situation.

(2) A definite program that contemplates the use of all means of communication available must be planned to cover unusual circumstances.

(3) The communication system of units in support of or attached to an armor organization must be integrated into the armor communication system.

(4) Planning procedure follows the principles discussed in FM 17–100 and FM 101–5.

Section II. APPLICATION OF TACTICAL COMMUNICATION

24. Communication During Marches

a. General.

(1) Marches are classified as two types: tactical and administrative. In either march, minimum essential communication facilities must be provided for control.

(2) When Army aircraft are available for column control, communication facilities for contact with aircraft should be dispersed throughout the column. During radio silence. commanders, when authorized by higher headquarters, may transmit vital messages on a DO NOT ANSWER basis to the column, and visual signals may be used to indicate receipt of such messages.

(3) When practical, the signal or communication officer should make a reconnaissance of the route of march to determine whether radio relay or retransmission stations are needed to maintain continuous communication.

b. Tactical Marches. Radio or listening silence may be in effect during tactical marches, but the degree of communication security desired must be weighed against the need for control and the reaction time of the enemy to transmissions. Communication is maintained by motor and air messenger as well as visual means. Mounted messengers are detailed to follow staff sections and be readily available when a message is to be dispatched. Visual communication is used extensively.

c. Administrative Marches. This type of march is made when no enemy ground interference is anticipated; therefore, radio and mounted messengers are the principal means of communication. Radio security must be carefully practiced to reduce or deny information to the enemy. When feasible, wire will be installed at the new area so as to be operative when the unit enters the new area.

25. Command Post Communication

a. The command post should be located on terrain that will provide good radio communication to higher, adjacent, and subordinate headquarters. Antennas must be unobstructed and placed on the highest ground available. Messengers are used to the maximum. The message center is established near the entrance to the command post and where it can be reached easily from the road net and is convenient to the staff.

b. Wire lines may be laid to subordinate and headquarters elements, depending upon time, equipment, personnel available, and the situation. Strict control must be exercised to limit the

number of wire lines to those necessary for transmission of essential messages.

c. Visual, sound, and messenger communication will be used to the fullest extent. Sound communication is of value in command posts for warning of enemy air or nuclear attack or for any situation that requires immediate notification of all personnel. All personnel must understand meanings disseminated by unit SOP or operation orders.

d. Panel displays for air-ground communication, including air message drop and pickup areas, must be provided for each separate command post location of battalion or squadron and above. The panel display area should be located on ground that is level and open, so that personnel in aircraft can read displays at wide angles from the vertical. A panel display normally is made only when friendly aircraft are overhead, but the base panels are prepared in advance and camouflaged.

26. Communication in Assembly Areas

a. To prevent enemy detection, application of communication security in all phases of selection and occupation of assembly areas is required. Radio communication in particular is kept to a minimum, usually by enforcement of radio silence except for certain essential stations.

b. All means of communication, with the exception of radio, are used to the maximum to meet the desired security requirements. Properly employed messengers and wire systems are not readily detected by the enemy, while sound and visual signals are. Every effort must be made to prevent such detection.

c. As attached and supporting elements join an organization in the assembly area, the following communication matters should be coordinated:

(1) Verify frequencies and call signs of attached and supporting units. If changes in these items are required because of mutual interference, the communication officer must coordinate changes with higher headquarters.

(2) Preparation and distribution of SOI extracts must be accomplished, and personnel must be briefed on communication SOP matters.

(3) Verify status of communication equipment and personnel.

(4) Issue any special signal instructions for the planned operation.

27. Attack Position and Movement to Contact

a. General. Coordination for communication and control should be completed before the unit arrives in its attack position. The concept of armor's use of the attack positions normally prevents final coordination of communication matters during the short time units occupy or pass through these positions. If the movement to contact involves passage of friendly lines, liaison must be made with the friendly units, and guides picked up in the attack position.

b. Use of Radio. Radio communication will normally be restricted until a few minutes before the time of attack. The restrictions on the use of radio are based on the reaction time of the enemy in the area as opposed to the control measures required for success of the immediate mission. Normally radio silence will be maintained until contact with the enemy is established.

c. Supplemental Means of Communication. Messenger and visual signals will be used extensively. During periods of darkness, both messengers and guides must be equipped with filtered lighting devices to decrease probability of detection by the enemy. Wire communication is seldom required or desired in the attack position or during the advance to contact.

28. Communication During Offensive Operations

a. Preparation. The plan for communication support for an offensive operation is based upon and coordinated with the operation plan, and depends directly upon the mission and organization for combat. For example, a combat command making a penetration may use additional radio relay equipment, whereas during exploitation it may use additional RATT equipment. Plans must be flexible enough to provide adequate communication support for the reserve when constituted. The communication plan for the attack must include provisions for a reinforcement of radio relay and RATT communication, backed up by messenger and, when feasible, air-laid wire. When the preparation for the offensive is made in an assembly area, communication is normally by wire and messenger. Radio traffic is held to a minimum and restricted to essential nets. When preparation for the offensive is made while the unit is engaged in other type operations, care must be exercised to maintain normal communication traffic to prevent a sudden change in volume of radio traffic that would reveal to the enemy that a change is imminent.

b. Coordination. The signal/communication officer coordinates communication plans for the operation with attached and supporting units, and insures that all equipment is brought to optimum operating condition. Signal orders and SOI extracts, along

with any required special prearranged signals or codes are disseminated to all units. Coordination is effected to furnish tank-mounted radio facilities for artillery and tactical air representatives. Plans must include integration of logistical elements into the communication system. Physical or map reconnaissance is made of probable routes to determine location of communication and key control points. If the objective is deep in the enemy's rear and the lines of communication will be extended, arrangements are made for communication support to provide additional radio relay facilities or air messenger service. If security requirements permit, radio sets and nets are checked by actual operation. All personnel briefed on the forthcoming operation must be informed of the plan to provide additional radio relay facilities or air messenger service.

c. Communication During the Attack.

(1) Radio is the principal means of communication used during the attack; however, radio relay or wire communication above company level is maintained whenever possible. Some form of radio restrictions are normally in effect before the attack. This restriction will usually be lifted as soon as units reach the line of departure. In certain instances, the commander may desire to continue listening watch until actual contact with the enemy is made or until he feels nothing further can be gained by such restrictions. To permit relief of radio traffic loads, wire lines are laid as far forward as practicable. To provide for radio communication in the event wire communication is disrupted, sufficient radios will remain in operation in each unit. Visual and sound signals are used to transmit prearranged messages prescribed in the SOI or by the operation order. Messenger communication is maintained as required.

(2) Radio and visual signals are used in armor units for communication between ground troops and aircraft—both Army aviation and Air Force. Warnings of air or nuclear attack must be disseminated immediately by the most expeditious communication means. Warning messages are given a FLASH precedence.

(3) Fire support communication is provided by radio and wire facilities from the supporting unit, augmented by additional radio equipment and supplemental means from the supported unit when required. Forward observers and liaison personnel are provided to operate this equipment.

d. Communication During Penetration. Penetration of enemy lines implies a deliberate attack on an enemy position, and communication for this type operation requires use of all means available. Communication plans are coordinated with operation plans of the command, and if overlay-type control measures are required they are provided by higher headquarters. Special requirements during the penetration include additional communication with fire support systems, with followup forces that hold the shoulders of the penetration, and with forces that will exploit the penetration when it occurs.

e. Communication During Exploitation and Pursuit. When armor units are used in the exploitation, AM radio and RATT are the primary means of communication to higher headquarters, supplemented by radio relay and Army aircraft. Lateral radio and radio relay communication between exploiting columns is essential. The rapidity of pursuit does not normally permit the construction of wire circuits even when employing air-laid wire. Full use is made of available commercial wire facilities along the route of pursuit where such facilities are intact or can be easily rehabilitated, and where precautions are taken to cut the line forward. When a unit halts during the exploitation for extended resupply or regrouping, it usually assumes a defensive attitude, and in this situation makes maximum use of internal wire systems to permit relief of personnel and maintenance of radio equipment and to supplement radio links. Pursuit requires that radio communication be provided between the direct-pressure force and the encircling force.

f. Communication During the Envelopment. Close envelopments require communication support similar to that of the penetration, while wide envelopments and turning movements develop communication problems more like those of exploitation. In any case, multiple routes of communication employed between the enveloping forces must be established for successful coordination of the operation. Timing in these actions is critical, and combinations of long range radio, telephone via radio relay, and radio-wire integration and use of aerial radio relay stations must be exploited. When radio relay terminal teams are left behind along the route of attack, local security must be provided from elements of the enveloping force.

g. Night Operations. Communications in night operations are the same as in any other armor operation, with emphasis on control and communication security measures. If the operation is to be successful, the communication plan must be as complete and yet as simple as possible. To further the objective of surprise, means of communication readily detectable by the enemy are

normally reserved for use after contact is established. If the night operation is a continuation of an operation already in progress, communication will be a normal continuation of means already in use. If the night operation is not a continuation, wire may be used in the initial stages. Pyrotechnics and other lighting devices are essential, but again, simplicity of use and meaning must be emphasized and personnel must be thoroughly briefed on the communication system that will be employed during the operation.

29. Communication During Passage of Lines and Relief in Place

a. Close coordination in communication matters must be made between a unit making a passage or withdrawal through lines and the unit being passed through, to achieve a successful passage of lines or withdrawal from action. Communication means include establishment of radio, wire, and messenger links, as well as liaison, between units. Visual identification signals, including arm and hand signals, panels, and pyrotechnics, should be prearranged. When an armor unit is passing through an infantry unit, FM radio links may be operated in the armor and infantry bands of frequencies after a mutual exchange of liaison officers and possibly radio components. Because all artillery units use the same band of frequencies, fire support coordination is facilitated. Infantry and armor units both employ common band radio sets which may be used for short range communication and automatic retransmission.

b. During relief in place, communication facilities of the relieved unit are taken over by the relieving unit insofar as possible. This is particularly applicable to wire lines. Before the relief, the relieving signal/communication officer coordinates with the unit to be relieved and, when practicable, arranges for the communication personnel of the relieving unit to precede the main force into the battle positions. Although responsibility for the communication system is assumed by the relieving unit when the command passes, the relieved unit, for security purposes, should continue to operate its normal radio nets for a limited period of time.

30. Communication During Defensive Operations

a. Mobile Defense. In the mobile defense radio is the only means of communication flexible enough to provide continuous communication among the widely separated strongpoints. The division area communication system, using radio relay equipment, may provide additional links between battalions and higher headquarters. If the situation permits, wire and messengers are used as supple-

mental means of communication. All supplemental means are used for internal communication, and facilities are improved as time and equipment is available. To deny the enemy information, use of radio should be restricted and special emphasis placed on communication security. Immediate contact with the striking force is essential. The commander responsible for the mobile defense as a whole must exercise control of communication.

b. Position Defense. Advance planning and the time available to prepare the defensive position usually determines the extent the communication system is developed. When a unit with little time for preparation establishes a defensive position, radio will be the primary communication means. When feasible, an extensive wire system may be installed. As the wire system is expanded the necessity for the use of radio is decreased, but radio nets will remain open for use when needed. To insure maximum communication ranges close supervision of the positioning and siting of radios is necessary. Increased emphasis is placed on the use of radio-wire integration and on entry into the area communication system, particularly in the position defense. Communication by all means practicable is provided to each observation post or outpost. Panels or other visual means are provided to mark friendly front lines. Lateral communication is established and maintained with adjacent units. To provide continuous communication, alternate locations are selected and prepared for occupation by all communication facilities. Supplemental means of communication must be coordinated to overcome enemy interference.

c. Delay. In a delaying action, the preparations made in the initial delaying position must be repeated at each subsequent location. Installation of wire and selection of locations for communication facilities before occupation of a position will greatly increase a unit's capability for an orderly and successful operation. Wire nets should not be abandoned in place as a unit withdraws, but recovered or destroyed. The use of airborne FM radio relay stations is advisable when units with little time and with widely dispersed elements are conducting a delaying action. Signal/communication officers make a ground or map reconnaissance to determine the signal support required for the delaying positions.

d. Withdrawal. When withdrawal from action is required, part of the security force should include facilities for maintaining established communication traffic patterns. Sufficient armor-protected radio equipment is left with the covering force to provide communication and operation of dummy stations. Call signs and frequencies are adjusted so that a small unit may represent a larger organization. For example, a company may simulate operation of a battalion. Technical support for this type operation is

available and must be coordinated with the combat command and division. Major elements on the move maintain a form of radio silence and use supplemental means for essential communication. Contact by any means available must be maintained between the security force and the withdrawing forces. Liaison personnel provide a secure means for exchanging detailed information.

31. Communication During Special Operations

a. Mountain Operations. In mountain operations terrain is highly restrictive both as to mobility of armor vehicles and as to effectiveness of FM radio. Thus the siting of radio equipment and use of auxiliary antennas are critical and installation of extensive wire nets is difficult. Extensive use of vehicles and aircraft should be made for FM radio relay stations. Ground messenger and liaison personnel will be slowed by road nets in mountainous terrain. Additional equipment may be obtained from higher headquarters, but organic personnel and equipment normally establish automatic retransmission stations or relay stations on key high ground to provide communication to areas in which radio transmissions are blocked by terrain. Dead space in radio reception will also occur with both AM and FM radios, but AM radio is the least affected. Visual signals are advantageous between high points in mountainous areas.

b. Desert Operations. Generally communication is facilitated by desert terrain, but problem areas in maintenance and camouflage will develop. Communication ranges may easily be extended in the desert by use of special antennas organic to armor units. Dust and rough terrain require more command emphasis on first-echelon maintenance, particularly cleanliness of equipment and tightness of mounting and connections.

c. Amphibious Operations. In amphibious operations the extensive communication system of armor units must be coordinated with the system of naval and other amphibious forces. This requires careful planning. In initial phases radio and visual signals are used extensively, and are supplemented by wire after the beachhead is established. Ship-to-shore and naval gunfire communication systems are covered in appropriate Department of the Navy publications.

d. Jungle Operations. In jungle warfare terrain limitations are similar to those encountered in mountain operations, with added difficulty in use of aircraft for communication missions. Installation of wire lines as a unit moves forward is necessary for effective communication. Because radio communication is poor, field expedients should be employed to elevate radio antennas above the dense vegetation and increased reliance must be placed on mes-

sengers. Sound and visual signals become extremely difficult if not impossible. Because of terrain and weather, maintenance of electronic equipment is critical and must be emphasized by commanders.

e. Cold Weather Operations. Operation and maintenance of communication equipment is difficult under conditions of extreme cold. Special preparation of equipment must be accomplished, such as use of arctic batteries and equipment covers, and personnel must be trained to operate and maintain equipment during periods of extreme cold. Condensation and freezing are problems accompanied by varying operating ranges for equipment, brittle insulation, and contracting wire and cables. Microphones are particularly sensitive to condensation and must be kept in covers. Batteries must be kept as warm as possible and at a high state of charge. Communication vehicles must receive special attention because the engine is used while the vehicle is stationary for extended periods. Radios should be turned on to warm up every few hours. See appropriate technical manuals for details.

f. Built-up Area Operations. When armor units are required to clear built-up areas, communication systems must be adapted to the construction in the area involved. Radio relay or automatic retransmission stations must be carefully sited to provide the best coverage possible. Messengers are used at all levels, and wire is used when the operation is extensive. External-interphone and visual signals are used by tank-infantry teams.

32. Armor-Airborne Link-up

a. General. Armor-airborne link-up operations are complex actions involving coordination and control of units normally working under self-established procedure. Ingenuity of the individuals coordinating communication between forces must be exploited to provide effective, continuous communication. At the same time the system must be simple enough to insure positive contact during rapid changes that occur in the tactical situation.

b. Planning. Coordination of SOP and SOI items, exchange of liaison personnel, and establishing visual identification systems for units and individual commanders are necessary parts of the plans and preparations. Conference between commanders, communication personnel, and staff officers will establish procedure to be used. Coordination will be accomplished during combined conferences. If conditions permit, actual rehearsals of the link-up procedure should be made, with emphasis on flexibility to meet changing situations once the operation starts. As the forces approach the critical stage of link-up, firm radio discipline must be enforced.

c. Radio.

(1) FM radio links must be coordinated with airborne units, which employ radios operating in the infantry band of frequencies. Links are established by exchanging components of FM radios among key personnel, exchanging liaison officers with FM radios, and establishing automatic retransmission facilities employing common band sets. Common band radios will provide short range communication facilities between advancing armor units and forward airborne elements as the link-up takes place. SOI's, SSI's, and extracts, including a common system of message authentication, must be carefully planned and disseminated to radio users likely to take part in initial contacts between link-up forces. Use of aerial relay stations extends the range and provides frequency coverage for FM communication during link-up operations.

(2) AM radios present no problem. However, frequencies, call signs, and procedure to be used must be coordinated. These radios provide the extended range communication link between forces.

d. Supplemental Means of Communication. Liaison personnel and aerial messengers provide the primary means for exchange of detailed information between forces. Smoke, pyrotechnics, and other visual signals must be well defined and thoroughly understood by all personnel.

Section III. COMMUNICATION FOR CLOSE AIR SUPPORT

33. General

Communication requirements for close air support include facilities for tactical air direction, processing air requests, and coordination. To insure expeditious processing of air requests, direct communication is provided from battalion or squadron level to division and from division to army. The communication for coordination and direction of close air support provides the link necessary to integrate tactical air support with fire and movement of armor forces. This insures safety of ground troops and expedites arrival of aircraft on target. Ground-to-air equipment used for direction of aircraft is organic to battalions and squadrons, except in special purpose units such as the armored amphibious battalion.

34. Air Liaison Officer

(fig. 1)

Communication equipment and personnel for an air liaison officer (ALO) assigned to an armored division are furnished by

the air control team (ACT) from headquarters battery of division artillery. The radio equipment consists of equipment operating in the artillery FM and UHF band of frequencies. The radio section in headquarters battery, division artillery, furnishes an additional team of two AM radios and an FM-AM retransmission station and personnel to extend the range of communication from the ALO at division fire support coordination center (FSCC) to the forward air controllers (FAC) with each committed combat command.

35. Forward Air Controller

The headquarters battery of each field artillery howitzer battalion, 105-mm, self-propelled, has an organic air control team (ACT) that is complete only when the FAC is provided by the US Air Force. The ACT consists of the FAC who is an experienced fighter-bomber pilot acting as team chief, and two men who are provided by the artillery battalion headquarters for operation of the equipment. When close air support is required for an operation each combat command will have one of these teams. The same basic equipment that is furnished to the ALO at division, except for the AM radios, is furnished to each ACT. Additional FAC's may be assigned to battalion-level organizations that have organic UHF radios for direct communication with aircraft. In organizations with tank-mounted UHF radios the S3 air also has an armored personnel carrier-mounted UHF radio interconnected with an FM radio. A portable FM radio operating in the armor band of frequencies may be used from a dismounted position, for automatic retransmission, to control and direct aircraft.

36. Employment of Equipment

a. UHF equipment is used in tactical air direction nets for mobile ground-to-air communication to direct aircraft to targets. When these nets are operated, ALO's and ACT's receive frequencies and call signs from the US Air Force. Intelligence and operation sections with UHF equipment monitor this net or receive spot reports from tactical aircraft on the *spot report receiver system* when the tactical air is supporting other organizations.

b. Control and coordination of close air support between ALO's, FAC's, and US Air Force are accomplished using FM and AM equipment. If the ALO at division FSCC is within the range capability of his FM radio set, he will use this radio in the *tactical air force control and coordination net FM.* If it becomes necessary to extend the range for control, he will employ his AM equipment and retransmit from the *tactical air force control and coordination net AM* into the FM net as shown in figure 1. The ALO will

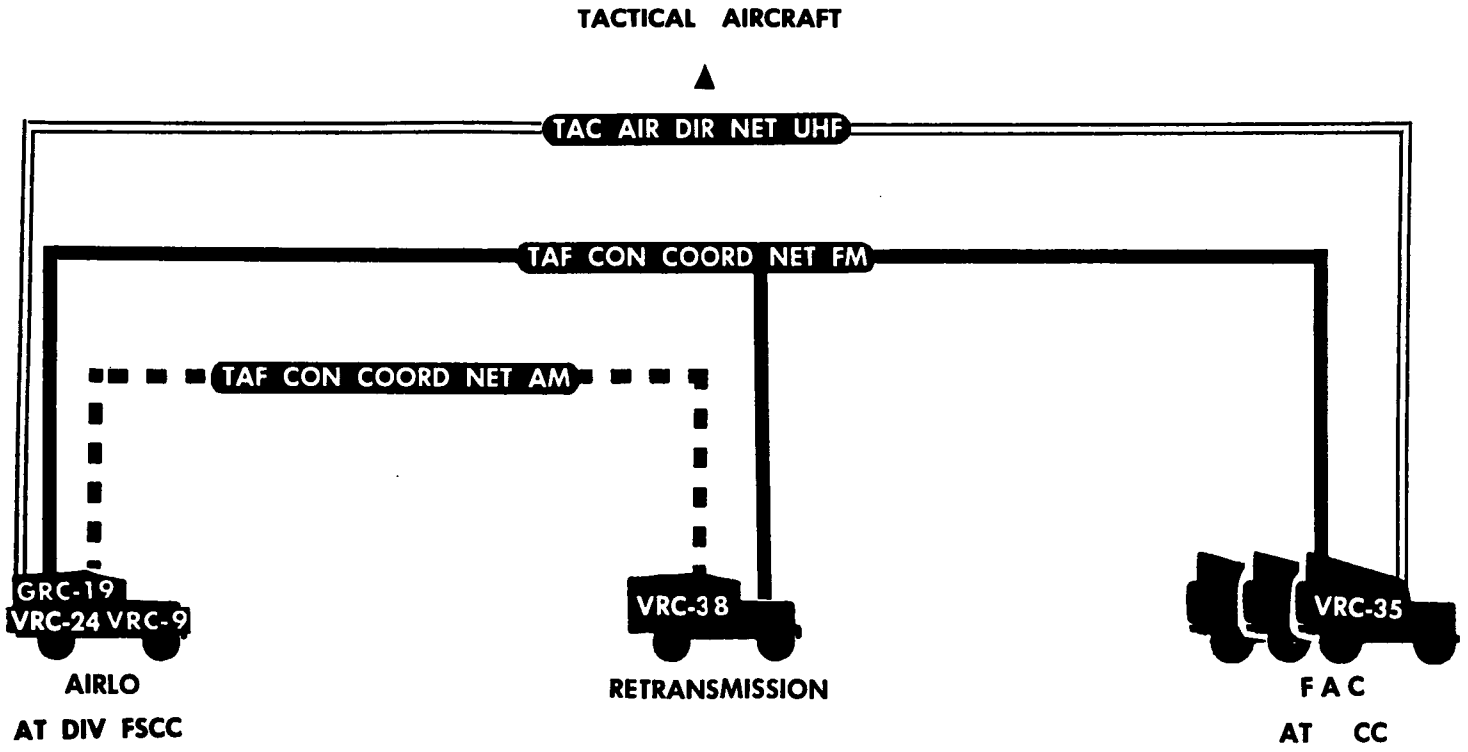


Figure 1. Type employment for air liaison officer's radio equipment.

employ his UHF radio in the *tactical air direction net* for communication with aircraft that may be operating in the division area.

c. Control and coordination between ALO's, FAC's, and ground unit commanders and staffs is conducted on ground unit command nets. Equipment to operate in these nets must be furnished by the unit receiving the close air support.

d. Requests for close air support are classified as preplanned or immediate, depending on the time available to process the request. Command nets and the *air request net AM* are used for these requests.

(1) *Preplanned* requests for close air support are processed from the requesting unit through the chain of command by any means capable of meeting time requirements.

(2) *Immediate* requests for close air support are processed from the requesting unit to battalion level on command nets. From battalion to higher headquarters, requests are transmitted on the division air request net to the division G3 air. Combat command monitors the request and signifies approval by remaining silent. The request is transmitted from division to army on the army air request net, monitored by corps. Parallel US Air Force communication facilities (FAC-ALO) can be used in an emergency, but is discouraged in order that these channels remain open for coordinating instructions in connection with air strikes.

CHAPTER 3

ARMOR AND ARMORED INFANTRY BATTALIONS COMMUNICATION

Section I. BATTALION HEADQUARTERS

37. General

Armor and armored infantry battalions of the armored division are self-contained units, with organic tactical and administrative elements. When they are organized as task forces, flexibility of communication is achieved by providing similar communication equipment and personnel to each task force. These battalions employ the same types of communication for command and control, and maintain stations in the same communication nets of the appropriate higher headquarters. Battalions have organic personnel and equipment capable of maintaining organic communication systems for limited periods of time. These periods are dependent on the replacement of parts and supply needed to maintain the system.

38. Command Communication

a. General. During normal operations the battalion operates in the following locations: the command post, the command group, and the battalion trains.

b. Command Post Communication. The main center for command and control of the battalion is located in the command post, where the preponderance of communication facilities are assigned. Facilities and equipment required include the net control stations for the battalion command and logistical nets, AM radios for contact with higher headquarters, and message center service providing supplemental means of communication. Messenger service and wire networks employed by the battalion terminate in the battalion message center. The message center provides centralized control of the communication system, and a relatively stable location for the rapid handling of plans, liaison, and instructions between subordinate elements and higher headquarters.

c. Command Group Communication. The command group consists of the battalion commander, required members of the staff, and essential facilities. This group is completely mobile and normally communicates by FM radio and mounted messenger.

d. Tactical Support Communication. Tactical support elements with the battalion usually include both artillery and engineers when the battalion is organized for combat as a battalion task force. These elements enter the battalion command net, and main-

tain communication in their own appropriate nets. For details of these systems, see specific chapters concerning the organization of interest.

e. Administrative Communication. Control of logistical and administrative support is centered in the S1/S4 vehicle, which as a combined section operates in the command post area. FM radio is the primary means of communication for logistical and administrative traffic, and AM radio for contact with higher headquarters.

39. Communication to Higher Headquarters

a. Division Radio Nets.

(1) The *division air request net AM* provides extended communication from the battalion S3 air to the division G3 air, employing either voice or radiotelegraph (CW). This net is used for traffic pertaining to both preplanned and immediate air requests.

(2) The *division logistical net RATT* provides for transmission of traffic to the division logistical and administrative elements from the S1/S4 vehicle, located in the battalion command post area. When authorized by division, and when net traffic permits, this net may be used for communication to the combat command administrative elements.

(3) The *division warning broadcast net AM* is monitored at the battalion command post by the S3 air, for receipt of alerts, warnings, or CBR data from higher headquarters. This information is disseminated to subordinate elements on battalion nets.

b. Combat Command Radio Nets.

(1) The *combat command command net RATT* provides an extended command and control link from combat command operations to subordinate battalion operations sections. This net is particularly well suited for transmission of lengthy operational traffic and provides a rapid means of relatively secure communication during widely dispersed actions.

(2) The *combat command command net FM* provides each battalion commander and his operations section with contact to higher headquarters, and provides the combat command commander with direct contact with his subordinate commanders. This net is used primarily for transmission of tactical information and fragmentary orders and for coordination with tactical elements of the combat command.

(3) The *combat command logistical net FM* provides communication to elements of the battalion located in the trains area. However, the battalion normally conducts its logistical traffic directly with the division logistics control center (DLCC). When the battalion support platoon is located in the combat command trains area it maintains stations in this net for control and coordination. When required, the battalion S4 enters this net for operation and coordination of logistical activities.

c. Supplemental Means. Supplemental means of communication are used by the battalion to maintain contact with higher headquarters as applicable. The message center located in the command post area is the controlling agency for these means. Messengers from combat command pick up and deliver materials at the message center. It is here that the battalion switchboard is usually located.

40. Internal Communication

(figs. 2 and 3)

a. General. Radio is the primary means of communication within the battalion. When the command post is expected to remain in one position for more than a few hours, a wire system is installed within the command post area, where the battalion communication platoon will tie subordinate elements into the switchboard. Messenger service is provided, unless the situation prevents its use.

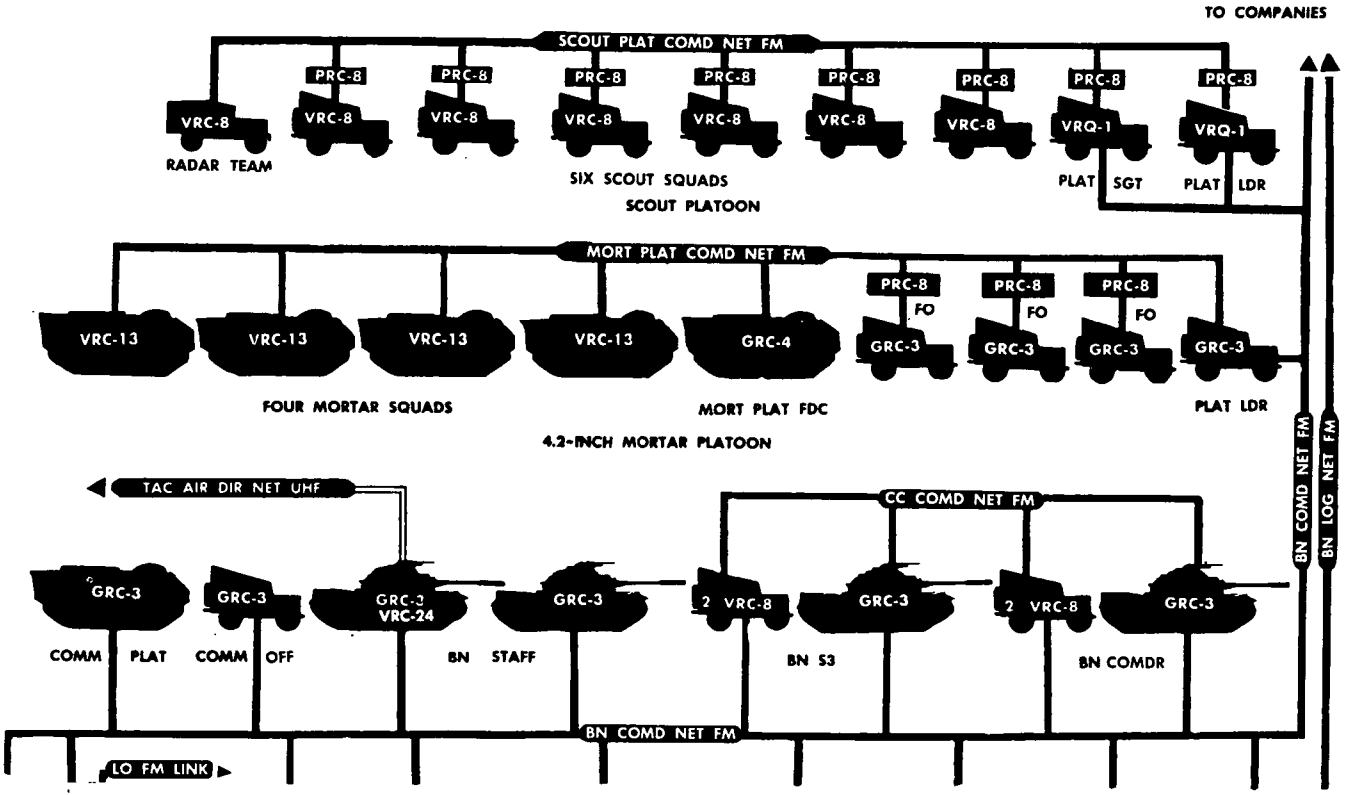
b. Radio Nets.

(1) *The battalion command net FM* provides the battalion commander and his staff with immediate voice communication with each other and with organic, attached, and supporting elements. Vehicular and portable sets make this net flexible and responsive to command requirements. Traffic includes tactical orders, coordination, and intelligence information. The net control station, normally in one of the operations vehicles, installs a special antenna to increase the operating range of this net.

(2) *The battalion logistical net FM* provides the battalion with the necessary means for transmitting logistical information from the line companies and attached or supporting units, to the battalion S1/S4 vehicle. Key staff officers will operate in this net and in the command net. This net also provides the battalion with an alternate channel of communication.

(3) *The battalion scout platoon command net FM*, controlled by the platoon leader, is employed by the scout platoon for internal communication.

(4) *The battalion mortar platoon command net FM* is used by the 4.2-inch mortar platoon, primarily for a fire direction net. In addition it provides internal communication. The net control station is usually the fire direction center.


TO COMPANIES
SCOUT PLAT COMD NET FM
PRC-8
VRC-8
RADAR TEAM
SIX SCOUT SQUADS
SCOUT PLATOON
VRQ-1
PLAT
SGT
PLAT
LDR
MORT PLAT COMD NET FM
VRC-13
GRC-4
FO
GRC-3
FOUR MORTAR SQUADS
MORT PLAT FDC
PLAT LDR
4.2-INCH MORTAR PLATOON
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CC COMD NET FM
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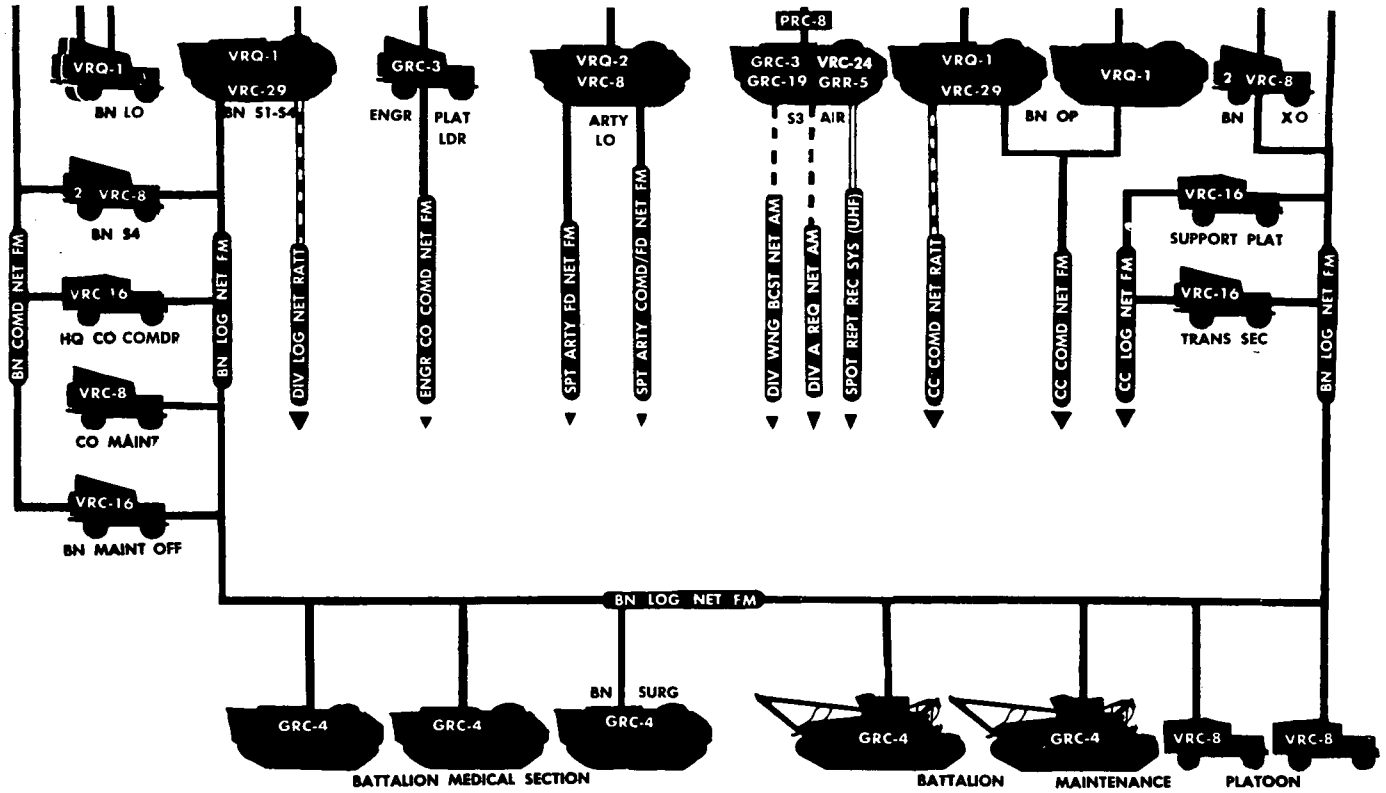
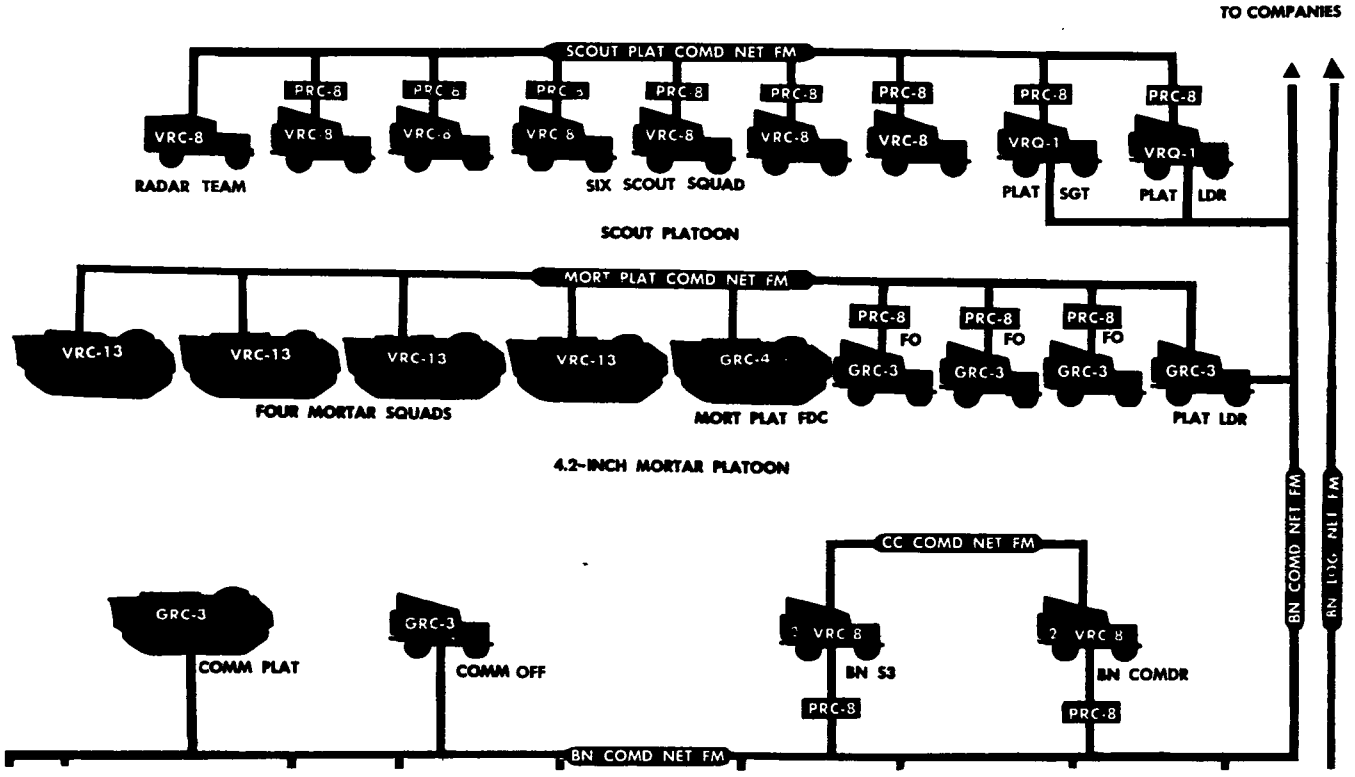


Figure 2. Type radio net diagram, headquarters and headquarters company, armored division armor battalion, 90-mm.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VRC-13
FOUR MORTAR SQUADS
GRC-4
MORT PLAT FDC
FO
GRC-3
PLAT LDR
4.2-INCH MORTAR PLATOON
CC COMD NET FM
GRC-3
COMM PLAT
COMM OFF
BN S3
BN COMDR
BN COMD NET FM
BN LOG NET FM

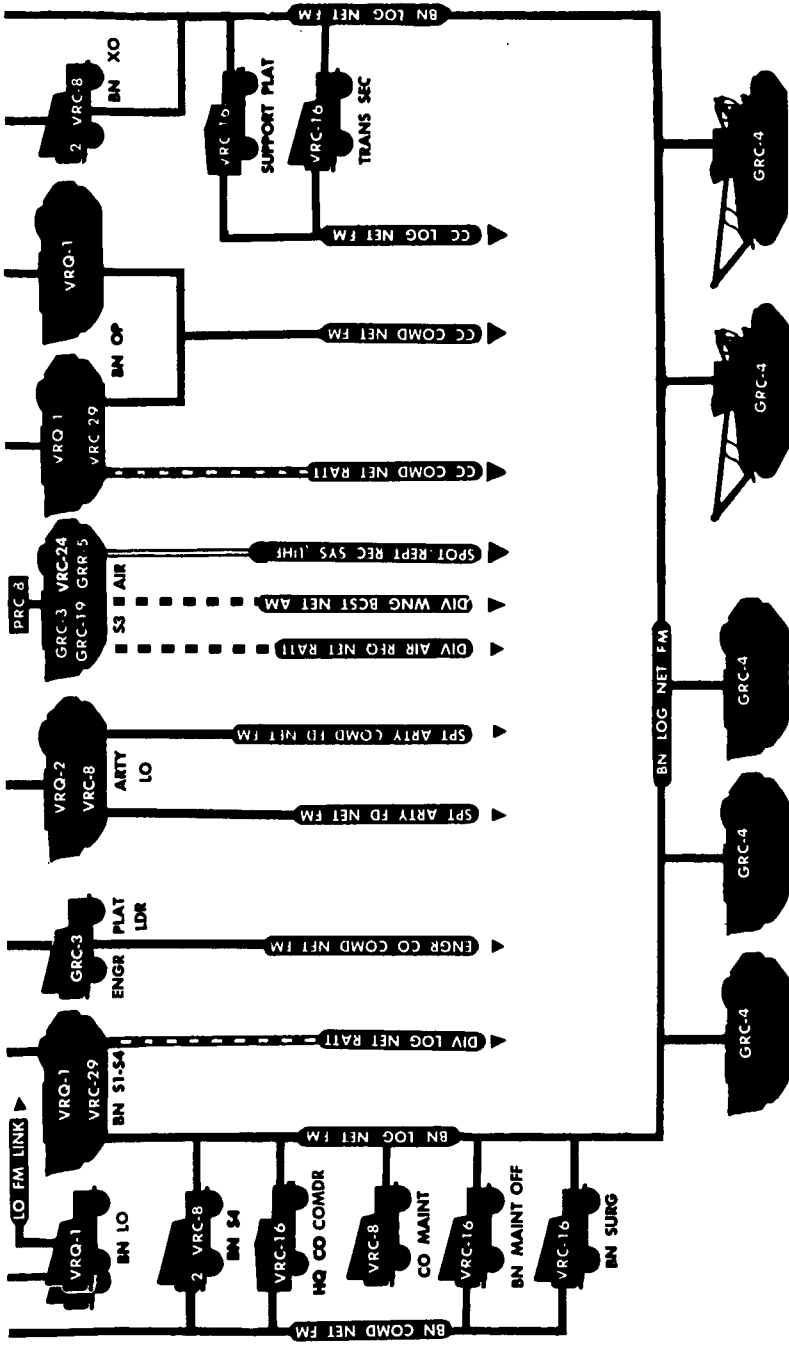


Figure 3. Type radio net diagram, headquarters and headquarters company, armored division infantry battalion.

Section II. BATTALION COMMUNICATION PLATOON

41. General

To adequately accomplish the duties outlined in paragraphs 13 through 15 each battalion communication platoon is authorized sufficient personnel and signal equipment. Personnel include supervisory personnel and teams for operation of AM and RATT radios and message center, wire communication, and second-echelon communication maintenance facilities.

42. Radio

A team chief and radioteletype (RATT) operators are provided for the two RATT stations in the battalion. Intermediate speed radio operators are provided for the S3 air AM radio.

43. Support

a. Message Center. Personnel and equipment authorized for operation of the battalion message center are transported in the communication platoon APC, which functions as the battalion communication center. The message handling facilities (a table, chair, file, and record log) and cryptographic facilities are normally placed in the APC. Message handling personnel and the switchboard operator may be required to monitor FM radio nets using the set mounted in the APC.

b. Wire Service. Wiremen in the communication platoon, assisted by the switchboard operator, motor messengers, and message center clerks install the wire system of the battalion. This system includes lines to the commander, staff, sections of headquarters company, and subordinate companies. The switchboard is usually located in the communication platoon APC, and is operated on a 24-hour basis.

c. Maintenance. Second-echelon maintenance of signal equipment organic to the battalion headquarters and headquarters company is accomplished by the radio and radar mechanics of the communication platoon. Some backup second-echelon maintenance for the companies is provided by these specialists. Communication platoon personnel are assigned to locations where they may best support the battalion. Evacuation of signal equipment from organic battalion elements is controlled by this platoon. In addition the company headquarters maintenance section has a radio mechanic for maintenance of equipment of headquarters elements in the battalion trains.

d. Command Post Lighting System. The command post electrical system is extended to operations and other staff sections as the commander desires from a generator located near the message

center. Power lines and lights are installed throughout the area by available personnel.

44. Other Means of Communication

Personnel of the communication platoon are trained in techniques of the supplemental means of communication, particularly visual. Panel displays for air-ground recognition, air message drop and pickup, heliport markings, and the employment of panels for transmission of short ground-to-air messages are taught and practiced. Thus supplemental means of communication are available to battalion headquarters as an integral part of the communication system.

Section III. COMPANY

45. General

a. FM radio provides a mobile, flexible means of communication in a tank or armored rifle company.

b. To increase range capabilities of FM radio, each company headquarters is issued a special antenna. Members of the company, with the exception of a few administrative personnel, must be familiar with radio operation, voice procedure, net discipline, and security measures. Because armor organizations normally operate as combined-arms teams, the communication system employed by tank companies is similar to that employed by armored rifle companies. In addition, either of these company teams may become an integral part of a battalion task force, and must have a communication system that will tie into the higher headquarters system with a minimum of confusion and effort.

c. When an artillery forward observer (FO) is assigned to a company team, an armored vehicle with radio facilities is provided for contact with the fire direction center in the artillery fire direction net. In the tank company, one of the headquarters tanks is used by the FO, and in the armored rifle company, the FO uses the company command post APC.

d. Visual signals are of special importance for tactical maneuvers, to decrease the traffic on radio nets and for control of small units during tactical or administrative movements. In static situations it may be possible to use wire. In addition to entering a wire system established by higher headquarters, each company has a limited capability of establishing an internal wire net.

e. All company personnel must be trained in the use of supplemental means of communication.

46. Communication to Higher Headquarters

Contact with battalion headquarters from company is provided on the *battalion command net FM* and the *battalion logistical net FM*. The tank company commander enters the command net from radios mounted in his tank, his ¼-ton truck, and the security section APC. The armored rifle company commander maintains stations in the command net from his ¼-ton truck, command post APC, and, when dismounted, from a portable radio. In each company, the executive officer maintains a station in the battalion logistical net from his ¼-ton truck. Each company has organic telephones and a switchboard.

47. Internal Communication

(figs. 4 and 5)

a. General. Even though FM radio remains the primary means of communication to all subordinate elements of the company, sound and visual signals are used extensively. This shows added reason for the training of all personnel in all means of communication. Speed is essential in all means used by the company, and training must be conducted to eliminate hesitation. Wire is used within the limitations imposed by organic capabilities and the tactical situation. Messengers are an integral part of the communication system. They are particularly useful when security is required or bulky material must be transmitted.

b. Radio.

(1) The *company command net FM* is established first, for command and control of all organic, attached, and supporting elements in a company and second, to transmit intelligence, logistical, and administrative traffic. This net is controlled by the company commander from his vehicular radio. When dismounted, the armored rifle company commander uses a portable radio. Sections of company headquarters are in the net. In tank platoons, both the platoon leader and the platoon sergeant operate in this net. Armored rifle platoon leaders and sergeants enter the command net when mounted, but only the platoon leader has a portable set for dismounted operation in this net.

(2) A *tank platoon command net FM* is assigned to each tank platoon in the armor band of frequencies. This provides a means of communication between each tank and the platoon leader, who controls the net from his tank. If such frequencies are not available, the company command net is used and emphasis is placed on supplementary means of communication.

(3) A *rifle platoon command net FM* in each armored rifle platoon operates in the FM common band of frequencies, and is controlled by the platoon leader. Vehicular and portable radios are furnished each platoon leader and squad leader for mounted and dismounted operation. The platoon sergeant does not have a radio assigned. He normally works with the machinegun squad, which has a vehicular radio capable of operating in both the armor band and common band of frequencies, and one portable common band radio for dismounted use.

(4) For combined tank-armored infantry operations within the company team organization, radio communication among platoons is possible on either the tank or rifle platoon command nets and the company command net. Each tank radio contains a common band set that will net in the armored rifle platoon command net. Each armored rifle platoon has 1 portable armor band radio and 2 vehicular-mounted radios providing operation in both the armor and the common bands. The armored rifle platoon leader uses the armor band radio mounted in the first rifle squad's APC for mobile operations, and a portable armor band radio in the company command net FM for dismounted operations. For the close coordination between tanks and infantry, each tank may enter the rifle platoon command net with the tank-mounted common band radio, provided for short range communication. This system furnishes radio communication from the individual squad to the individual tank within the range limitation of the common band radio for both mounted and dismounted operation. When greater ranges are required, automatic retransmissions may be accomplished from the common band to the armor band radio, through any of the team vehicles employing combination armor and common band radios. An additional means for close coordination is supplied by the external telephone found at the rear of each tank. This provides communication from the dismounted troops to the crew of a tank through the tank interphone system.

c. *Supplemental Means of Communication.*

(1) To eliminate confusion, meanings assigned to the various visual and sound signals must be uniform. Of particular importance to armor in the use of visual signals is the requirement to pass on signals as received, regardless of the tactical formation in use. Techniques in handling tactical maneuvers by visual signals must be

practiced continuously. In the armored rifle platoon, visual signals are the primary means of communication used by squad leaders for command and control of the squad.

(2) Wire equipment is available in sufficient quantities to allow installation of a sound-powered telephone system terminated in the company switchboard. Each armored rifle platoon may place a total of 3 instruments in the wire system, including 1 sound-powered telephone, and 1 radio control group that has a telephone capability. The tank platoon has 1 sound-powered telephone and 1 radio control group, permitting entry into a company wire system. When wire lines are required within the company, available personnel must assist the organic communication specialists in installation, operation, and maintenance of the system.

(3) Messengers are not organically assigned to the tank company, and personnel normally available in either the company command group, the trains, or in the individual platoons must be trained as messengers. Two messengers are assigned to the armored rifle company headquarters, and one messenger is assigned to each armored rifle platoon. In spite of the difference in company organization, messenger service is essential to both companies and message handling must be taught in unit training.

d. 81-mm Mortar Platoon Communication.

(1) The 81-mm mortar platoon of the armored rifle company has an organic capability for installation, operation, and maintenance of its own wire system. As a supplementary means of communication, wire is normally installed from the mortar platoon to forward observers. Thus, the mortar platoon will employ a combination of both radio and wire nets to provide close and continuous support to the forward elements of the company.

(2) The mortar platoon portable radios are used primarily by the squad leaders when they are acting as forward observers.

48. Communication Personnel

Communication specialists are assigned to each company headquarters for general duties similar to those performed by the battalion communication platoon. These are the communication chief (in the armored rifle company), who normally rides in the company command post APC, and a radio mechanic, who rides with the company maintenance section.

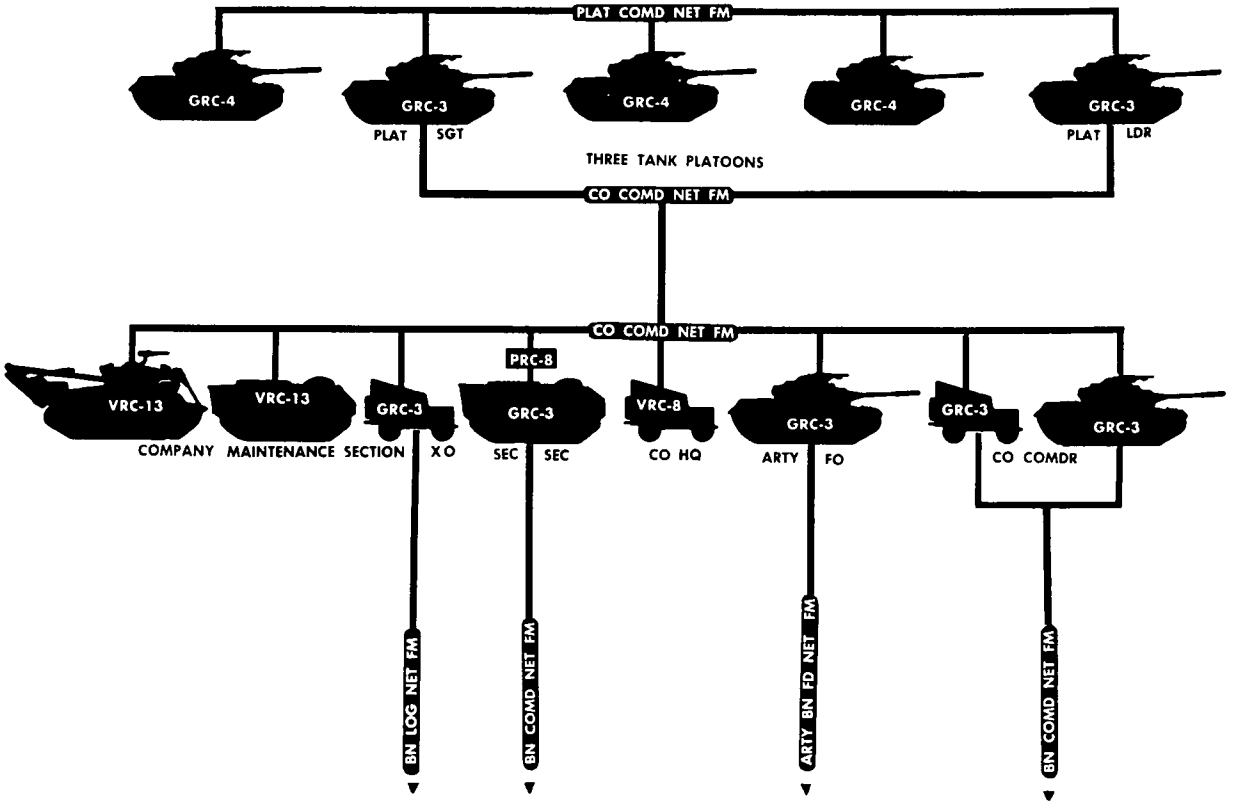
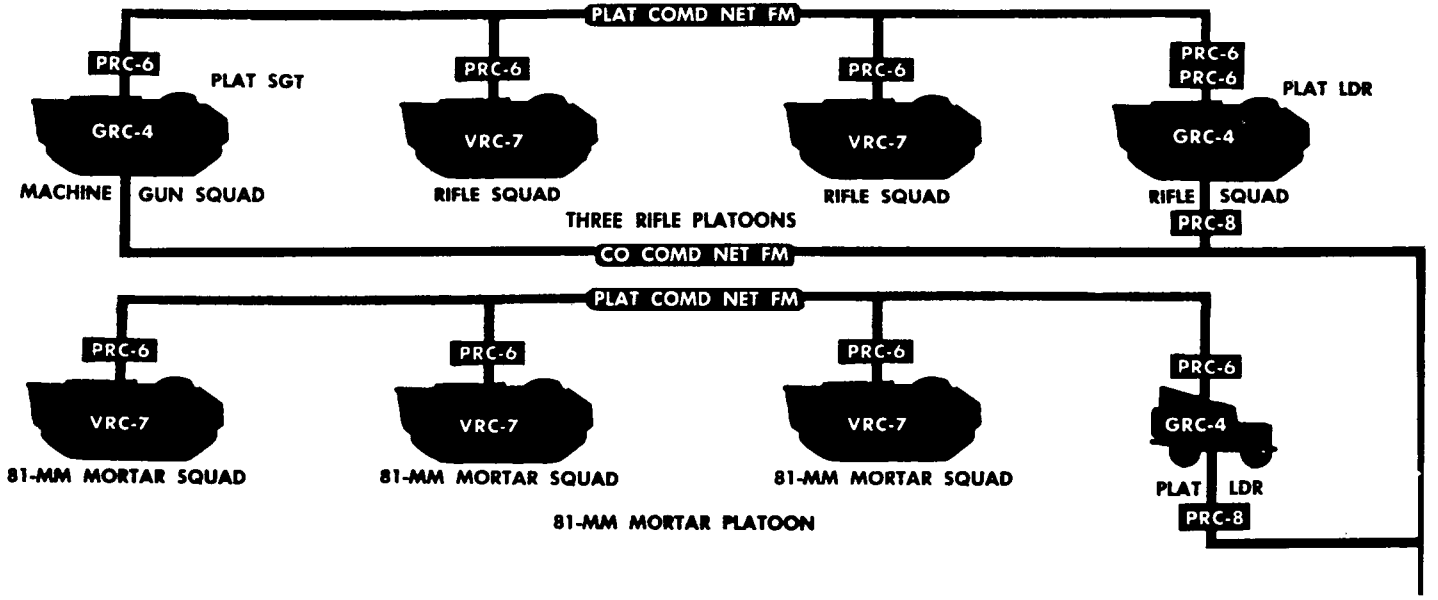


Figure 4. Type radio net diagram, tank company, armored division armor battalion, 90-mm.


PLAT COMD NET FM
PRC-6
PLAT SGT
GRC-4
MACHINE GUN SQUAD
PRC-6
VRC-7
RIFLE SQUAD
PRC-6
VRC-7
RIFLE SQUAD
PRC-6
PRC-6
PLAT LDR
GRC-4
RIFLE SQUAD
THREE RIFLE PLATOONS
PRC-8
CO COMD NET FM
PLAT COMD NET FM
PRC-6
VRC-7
81-MM MORTAR SQUAD
PRC-6
VRC-7
81-MM MORTAR SQUAD
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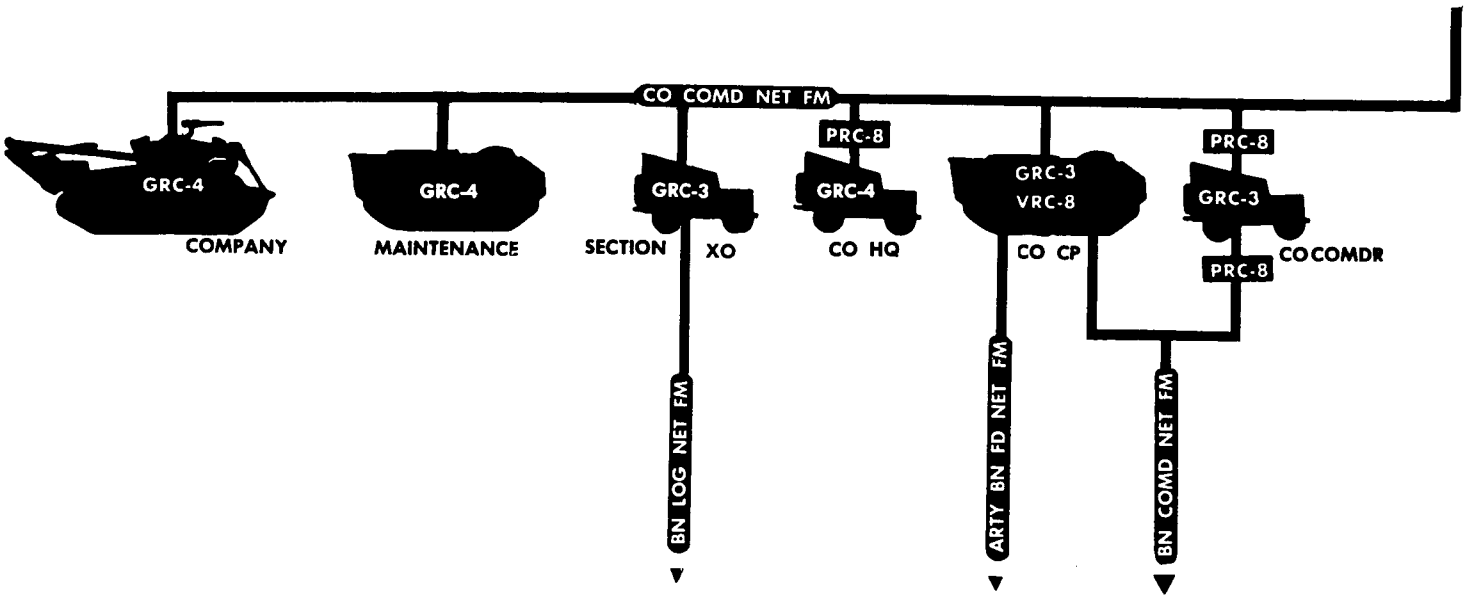


Figure 5. Type radio net diagram, rifle company, armored division infantry battalion.

CHAPTER 4

ARMORED DIVISION CAVALRY SQUADRON COMMUNICATION

Section I. SQUADRON HEADQUARTERS

49. General

a. The armored cavalry squadron has a communication system comparable to the armor and armored infantry battalions (ch. 3). Differences are the result of requirements created by the missions normally assigned to the armored calvary squadron—reconnaissance, security, and economy of force. Since in this chapter only the differences of the two systems will be discussed, a complete understanding of the squadron system requires a study of chapter 3 in addition.

b. By their definitions, these above missions create the need for an extensive and flexible communication system. Although the armor and armored infantry battalions may be assigned these missions, only the armored cavalry squadron has the organic communication means to fully exploit these missions.

c. This unit will be expected to operate under direct control of the division or attached to a combat command in whole or in part.

50. Communication to Higher Headquarters

a. General. The armored calvary squadron headquarters operates in the same general groupings (command group, command post, and trains) as discussed in paragraph 38. However, the capability for communication to higher headquarters is greater than that of the armor and armored infantry battalions.

b. Radio (fig. 6).

(1) When the squadron is employed under division control, the command group and the combined S2/S3 sections operate in the *division command net FM*. When the squadron is attached to a combat command, it will communicate in the same nets as does an armor battalion. An additional radio organic to the squadron headquarters is operated in the *division intelligence net RATT* for exchange of intelligence information.

(2) The squadron liaison officer at higher headquarters (normally division) maintains a station in the *squadron command net AM* in addition to the normal FM links employed by liaison personnel. This AM net provides an important link to higher headquarters.

(3) Special antenna equipment is organic to the squadron headquarters to extend the range of FM radios.

c. Supplemental Means of Communication.

(1) When possible the squadron enters the nearest division area signal center (par. 124). When subordinate to a combat command the squadron takes advantage of all services provided by the combat command and the division area communication system. Wire equipment in sufficient quantity for an extensive internal network is provided; however, wire communication to higher headquarters will be through services of the division signal battalion.

(2) Liaison officers and mounted messengers convey information from squadron to higher headquarters as an integral part of the communication system. Of particular importance is the transmission of maps, intelligence information, and other classified materials by messengers. Squadron liaison officers maintain communication with higher and adjacent organizations.

51. Internal Squadron Communication

a. Radio. The primary means for command, control, and administrative traffic within the armored cavalry squadron is FM radio employed in the *squadron command net FM* and the *squadron logistical net FM*. Operation of these nets is covered in paragraph 56*a*. In addition to these FM facilities, the squadron operates a *squadron command net AM*, of which the S3 is the NCS. Other stations operating in the net are the trains, line troops, and the liaison team normally located at the higher headquarters. Information transmitted over this net is primarily operational and intelligence, but administrative traffic may flow over the net when the traffic load permits.

b. Supplemental Means of Communication.

(1) Because of the widely dispersed operations of the squadron, communication must take advantage of all organic means and also of the means gained through entry into the systems of higher and adjacent units, including the division area communication system (par. 123). In highly mobile operations, which are characteristic of the squadron, often the only way to maintain communication must be through a combination of automatic retransmission and radio-wire integration. Members of all armored cavalry units must receive detailed training in the use of organic equipment to insure taking maximum advantage of auxiliary equipment capabilities.

TO ARMD TROOP
SQ COMD NET AM
SQ LOG NET FM
DIV COMD NET FM
SPT ARTY BN FD NET FM
TAC AIR DIR NET UHF
SQ COMD NET FM
SQ COMD NET AM
GRC-3
SQ COMDR
2 VRC-8
GRC-3
SQ S3
2 VRC-8
GRC-3
LO
ARTY
GRC-3
VRC-24
F A C
VRQ-1
GRR-5
OFF
COMM
VRC-8
RADAR
VRQ-1
VRC-29
SQ S1-S4
2 VRC-8
VRQ-1
VRC-29
SQ S2
VRQ-1
GRC-19
VRC-24
GRR-5
SQ S3 AIR
VRQ-1
VRC-29
COMM
PLAT
SQ
VRQ-1
GRC-19
OP
SQ
VRQ-1
LO
SQ
GRC-19
VRC-16
SQ
VRQ-1
LO AT DIV

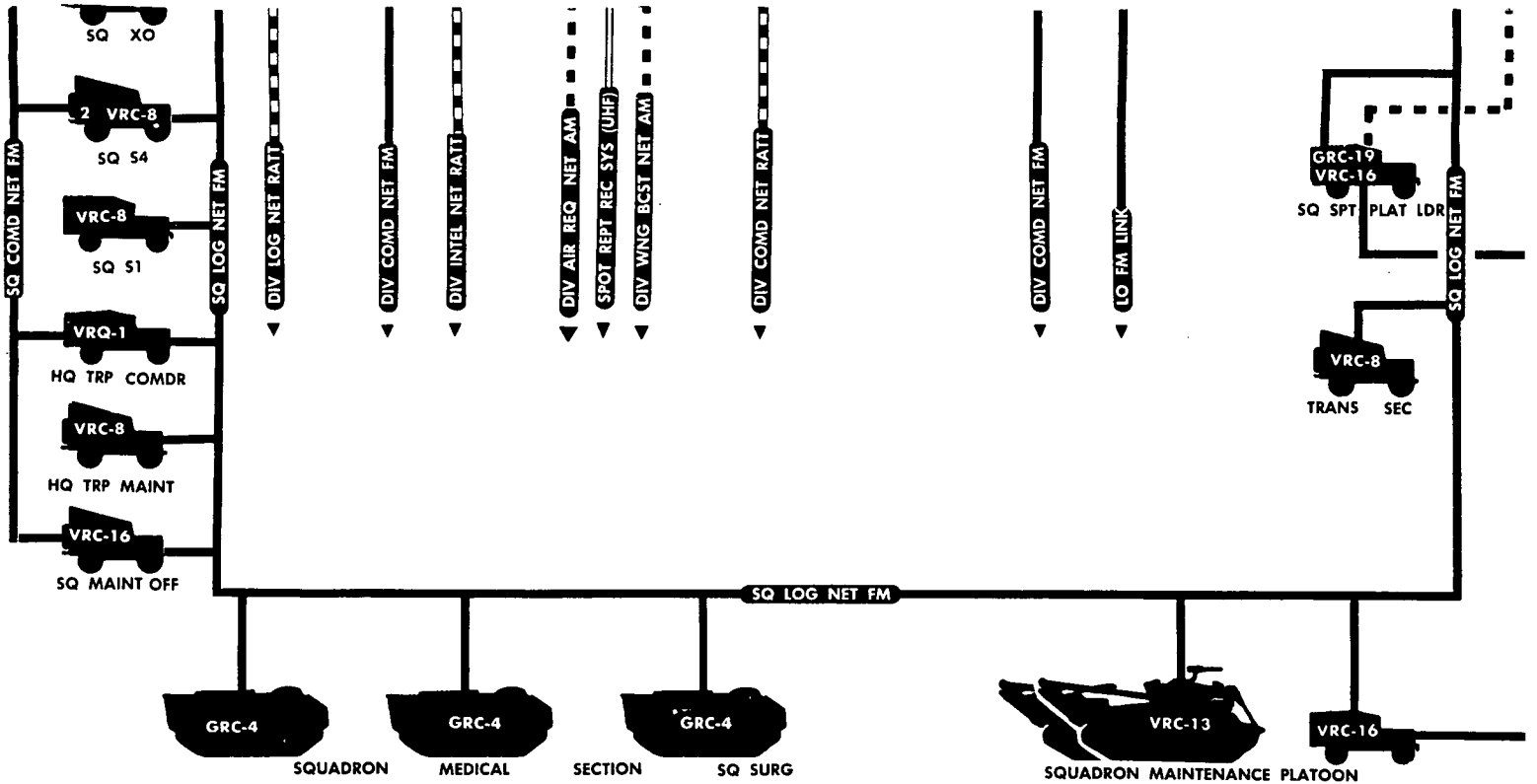


Figure 6. Type radio net diagram, headquarters and headquarters troop, armored division cavalry squadron.

(2) In the use of supplemental means of communication, armored cavalry units follow the pattern established for other armor units. The missions assigned this organization require emphasis on selection of a supplementary means of communication that will supply the needed security in a particular situation.

52. Aerial Surveillance Platoon Communication

Aerial surveillance platoon communication follows the general principles of armor communication. When the aerial surveillance platoon from the division aviation company is under operational control of the squadron commander, it becomes an integral part of the squadron for purposes of communication, and enters squadron nets as required. However, it must maintain communication with the base airstrip, because of the particular requirements for coordinating operation of aircraft and drones. The aerial surveillance platoon has organic personnel and equipment to accomplish this (par. 137 and fig. 23).

53. Emergency Communication Requirements

When the squadron must provide emergency communication for a higher headquarters, on-the-spot adjustments must be made for internal communication and contact with higher headquarters. The squadron SOP should provide a basis for such communication support. An example of such support is that provided to a casualty assessment team.

54. Communication Platoon Support

Support required in the armored cavalry squadron is greater than that in other armor units of battalion size because of the normal missions and assignment of equipment in the squadron. Basically the services provided are identical with those of other battalions, but additional radio operators are provided for both RATT and CW radio operations.

Section II. TROOP

55. General

Employment of the armored cavalry troop on independent missions is not unusual; thus compared to that in other company-level armor units the need for extended communication is increased in the troop. Organic equipment and personnel are provided to fulfill this need. Details concerning company-level communication found in paragraphs 45–47 are applicable also to troop communication.

56. Radio

(fig. 7)

a. In addition to the *squadron command and logistical nets FM,* which employ special antenna equipment to increase the range of FM radio, the troop maintains communication to higher headquarters on the *squadron command net AM.* Use of these nets follows the general concept discussed previously. Special antenna equipment is used also for extending the range of the *troop command net FM* for communication to subordinate elements.

b. Each armored cavalry platoon is assigned the necessary call signs and frequencies, if authorized, for operation of a *platoon command net FM.* Tank platoons of armor battalions discussed previously may not be assigned a platoon net because of frequency assignment limitations. If platoon frequencies are authorized, the armored cavalry should be given higher priority.

57. Supplemental Means

The use of supplemental means of communication in the armored cavalry troop follows the established pattern in other armor units, emphasizing the need for all personnel to develop an ability to choose the proper means of communication according to the situation, mission, and security requirements. When possible, the armored calvary troop on an independent mission should enter directly into the area communication system at the nearest signal center and take advantage of the services available. Visual signals are of tremendous importance to armored cavalry units, particularly below troop level; therefore, emphasis must be placed on using standard meanings for visual signals, including arm and hand signals. See FM 21–60.

58. Communication Support

In concept, support for the troop is identical to the support given to other armor units of company size. In practice, however, because of additional signal equipment, troop support requirements are greater than those of companies. The troop has a communication chief and radio mechanics to perform organizational maintenance. During operation of the troop on missions involving dispersion, this organizational maintenance must be carefully planned and coordinated to keep the communication system functioning.

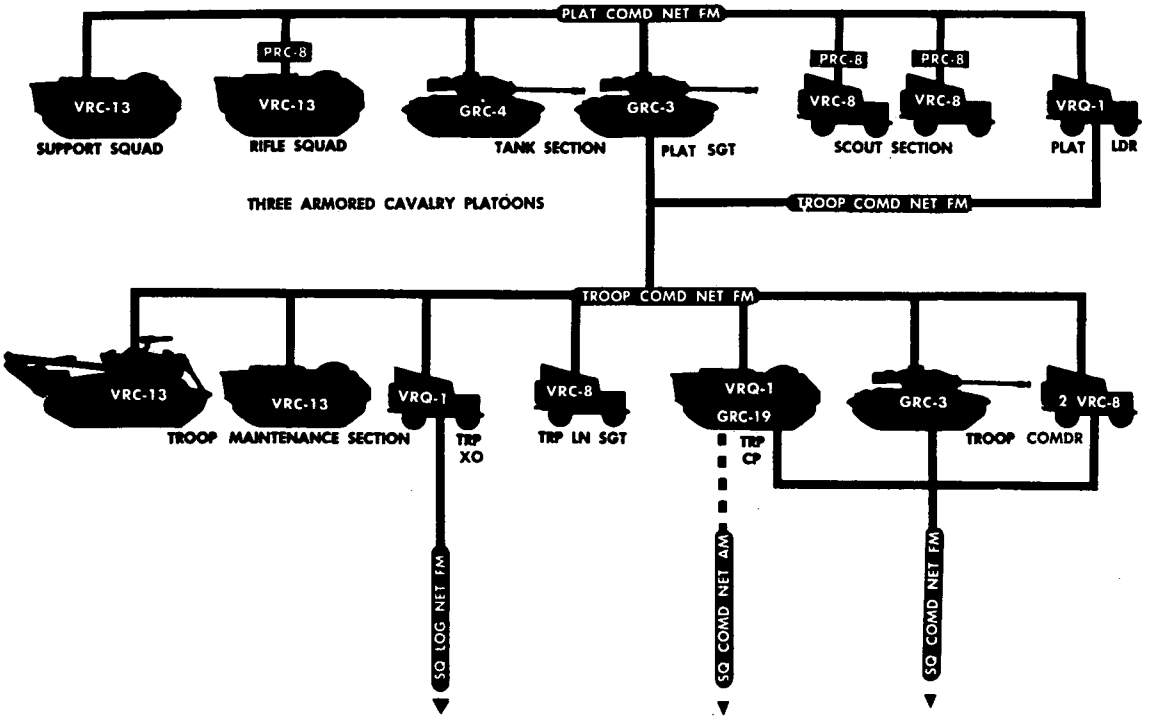


Figure 7. Type radio net diagram, armored cavalry troop, armored division cavalry squadron.

CHAPTER 5

COMBAT COMMAND COMMUNICATION

Section I. COMBAT COMMAND HEADQUARTERS

59. General

a. The combat command is the tactical headquarters immediately subordinate to the armored division headquarters. It has command and control of such attached and supporting elements that may be allocated from division to accomplish assigned missions. The organization of this tactical unit is completely flexible in that it is merely a headquarters unit with attached and supporting tactical organizations. The communication system of the combat command must provide the versatility required for control of any conceivable organization dictated by the commander's estimate and plan.

b. During normal operations, the combat command headquarters may be expected to operate in three general groupings: a *command group,* composed of the commander and such members of his staff as desired; the *command post,* where the bulk of the headquarters personnel are located; and the *trains,* where support elements of the command, including trains from attached and supporting units of the combat command, are located. Organic communication of the combat command headquarters provides the means for command and control of these groupings besides the tactical elements of the combat command.

c. The communication officer is a member of the combat command staff. He has one assistant, who is also the platoon leader of the combat command communication platoon. General duties of the communication officer are covered in paragraph 6. In addition to these duties, he has operational control over the communication platoon and coordinates the activities of the combat command area support platoon of the forward communication company from the division signal battalion.

d. This chapter will consider the specific communication requirements and capabilities of the combat command. General principles and detailed techniques of communication as discussed in chapters 1 and 2 apply to the combat command.

60. Communication to Higher Headquarters

a. General. The combat command maintains communication to higher and adjacent headquarters by operating subordinate stations in division radio nets, and maintains communication over telephone and teletype circuits provided by the division area communication system.

b. Radio (fig. 8).

(1) *Division command net RATT.* The combat command operations section operates in this net from the command post area. This net is used to extend the communication range for the combat command and to transmit situation and other detailed reports to the division operations section. When authorized it may be used for communication to other combat commands, division artillery, and other divisional units in the net.

(2) *Division command net FM.* For communication with division the combat command commander maintains a radio in this net from the command post or the command group. The operations officer (S3) and his section employ this net for coordination of tactical matters with the division staff.

(3) *Division intelligence net RATT.* The combat command intelligence officer (S2) operates a station in this net for exchange of intelligence information with division headquarters and other division units.

(4) *Division logistical net RATT.* The combat command logistical officer (S4) and his section operate two medium power RATT stations in this net. One radio is located in the command post area (under control of the S4), and the other in the trains (controlled by the support platoon leader as the assistant S4). This net provides a means for transmission of logistical information to the division logistics control center (DLCC) and division support units. When authorized and when the traffic load permits, this net may be used for communication with attached and supporting logistical elements of the combat command.

(5) *Division air request net AM.* The combat command S3 air operates a subordinate station from the command post area in this net, using voice or CW.

(6) *Division warning broadcast net AM.* An AM receiver is monitored in the S3 air's APC in this voice net, which is used by division to transmit alerts, warnings, and CBR data.

c. Wire and Radio Relay.

(1) Telephone and teletype communication from higher headquarters to the combat command is seldom installed as a pure wire system; it is accomplished through the division area communication system. The combat command area support platoon establishes a signal center to provide the combat command with multichannel radio relay,

telephone, and teletype service to other subscribers in the area communication system. Normally cable is installed from the signal center to the combat command switchboard. This provides sole-user circuits as required to the operations section and the senior artillery liaison team, while the other circuits (common-user and teletype circuits) are used for other traffic. This system ties combat command to higher, adjacent, and subordinate headquarters. When wire or radio relay circuits are installed, the combat command may use its organic land line teletypewriters.

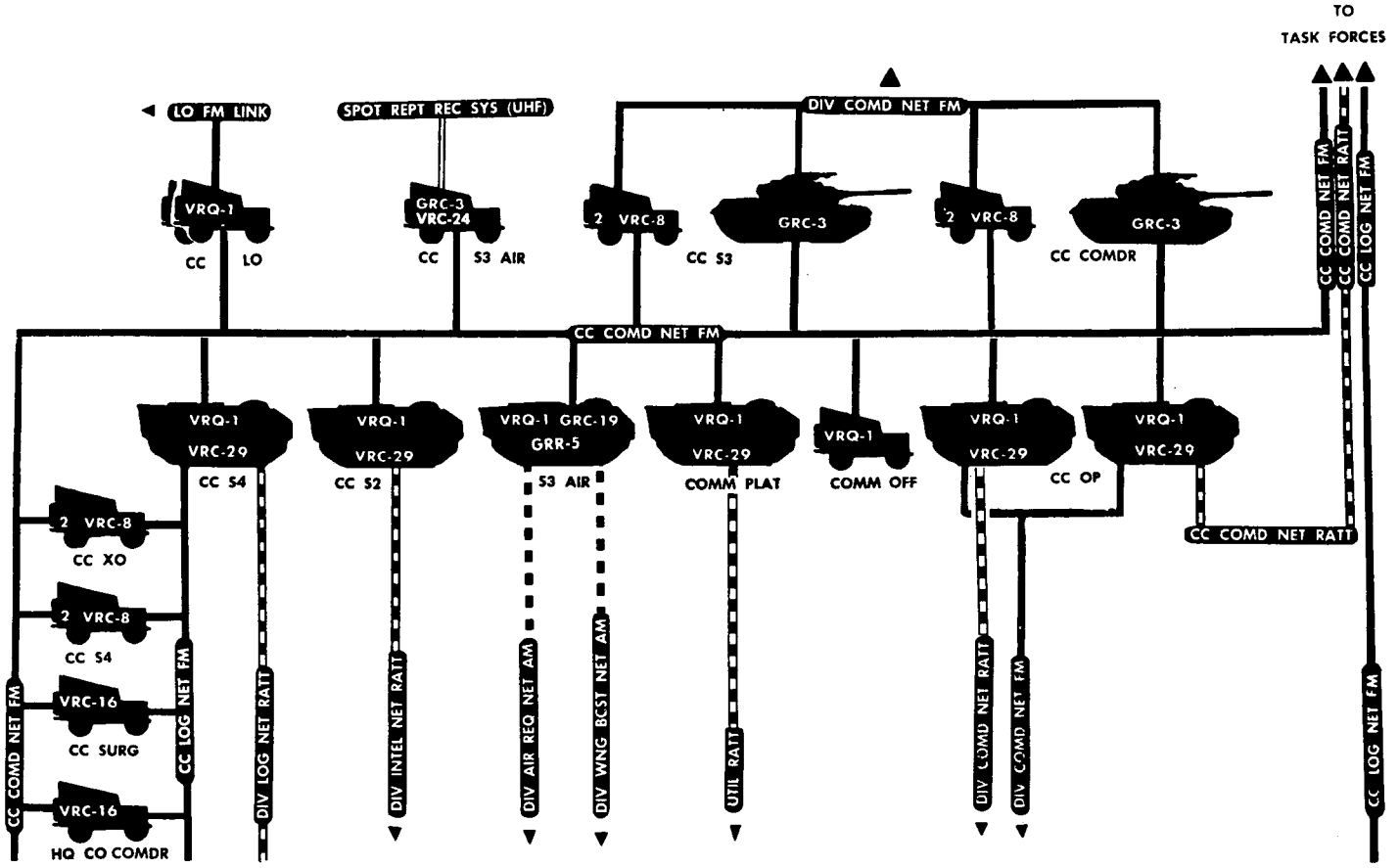
(2) The area communication system provides telephone and teletype service through wire, coupled with radio relay equipment, between the division headquarters and trains, DLCC, the combat command command post and trains, and other tactical or support elements of the division (pars. 121–124).

d. Messenger. Messenger service, both scheduled and special, is provided by the division signal battalion to the combat commands. Each combat command area support platoon has one motor messenger for special deliveries, in addition to the scheduled messenger service to higher and adjacent headquarters. When available, the combat support section from the division aviation company provides aircraft for message delivery. Messengers organic to the combat command communication platoon may also be used for special message service to higher headquarters. For example, reports such as the combat vehicle status report and personnel daily summary report may be transmitted by these organic messengers.

e. Visual. Employment of visual signals at combat command is similar to that used throughout other armor units. Panels are used to display unit headquarters identification numbers, which are assigned in the SOI. Friendly unit recognition and front line identification are accomplished by the dislay of fluorescent panels. Pyrotechnics, lights, and smoke signals are used with prearranged meanings as established in the SOI and operation orders.

61. Communication to Subordinate Units

a. General. Communication to subordinate units of the combat commands include the use of all means available to armor units that meet the requirements for command, control, and coordination. Radio is the primary means of communication due to the speed and flexibility it affords in rapid changes of task organization and mission. Supplemental means are selected according to the requirements of the tactical situation.


TO
TASK FORCES
LO FM LINK
SPOT REPT REC SYS (UHF)
DIV COMD NET FM
VRQ-1
CC
LO
GRC-3
VRC-24
CC
S3 AIR
2 VRC-8
CC S3
GRC-3
2 VRC-8
CC COMDR
GRC-3
CC COMD NET FM
CC COMD NET RATT
CC LOG NET FM
CC COMD NET FM
VRQ-1
VRC-29
CC S4
VRQ-1
VRC-29
CC S2
VRQ-1 GRC-19
GRR-5
S3 AIR
VRQ-1
VRC-29
COMM PLAT
VRQ-1
COMM OFF
VRQ-1
VRC-29
CC OP
VRQ-1
VRC-29
2 VRC-8
CC XO
2 VRC-8
CC S4
VRC-16
CC SURG
VRC-16
HQ CO COMDR
CC LOG NET FM
DIV LOG NET RATT
DIV INTEL NET RATT
DIV AIR REQ NET AM
DIV WNG BCST NET AM
UTIL RATT
DIV COMD NET RATT
DIV COMD NET FM
CC COMD NET RATT
CC LOG NET FM

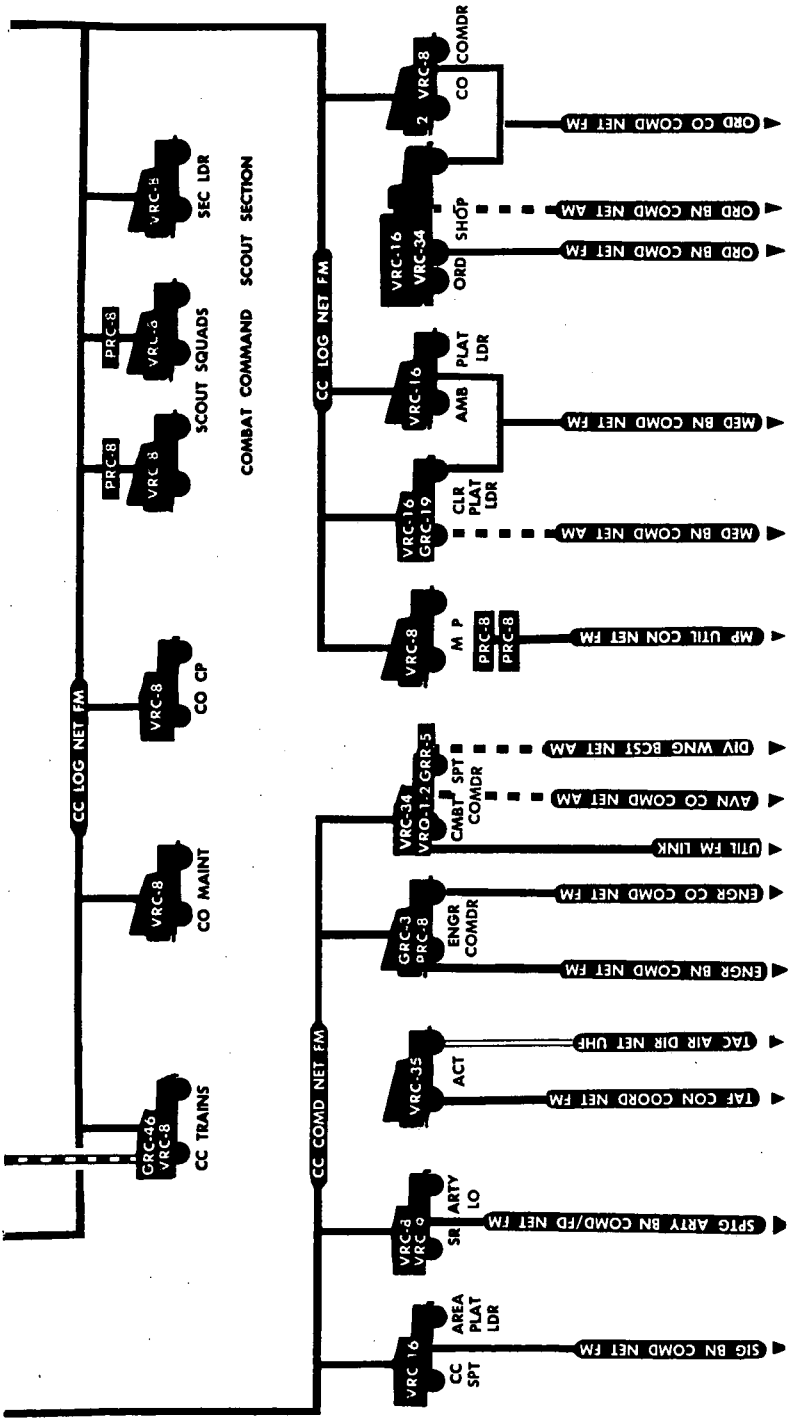


Figure 8. Type radio net diagram, combat command.

(1) *Combat command command net RATT.* This net is the primary link for operational command and control of major subordinate elements of the combat command. The net control station is operated in the command post area under the direction of the operation officer. An alternate NCS may be provided when required. Operation sections of all attached armor and armored infantry battalions maintain stations in this net.

(2) *Combat command command net FM.* Tactical command and control from the combat command commander to commanders of subordinate elements and staffs are provided by this net. Combat command staff members also operate in this net, which is controlled by the S3, for operational interstaff coordination and communication to subordinate elements. Support elements such as artillery, engineer, and tactical air representatives may enter this net.

(3) *Combat command logistical net FM.* This net is used for the transmission of administrative and logistical messages, primarily within and between the command post and trains area. The combat command logistical officer operates the net control station, and uses the net to contact the trains. The S4's of battalions may operate in this net for coordination of logistical matters. The scout section of the combat command headquarters uses this net for command and control purposes, including contact with the headquarters company commander. Elements of attached and supporting units, when located in the combat command trains area, maintain a station in this net for coordination of logistical matters.

(4) *Combat command intelligence net FM.* This is a provisional net that may be authorized when required and when call signs and frequencies are allocated by the division signal officer. The combat command intelligence officer controls this net, and intelligence personnel of subordinate units maintain a station in the net from the subordinate unit operation sections. Equipment is available for this purpose, except during operations in which the subordinate units command post is split.

c. Communication with Supporting Elements. The combat command organized for combat contains elements that enter either the combat command command or logistical net. These elements also maintain communication with their parent organization and

usually include artillery, engineers, medical clearing station, aviation, military police, ordnance, and other elements, as covered in subsequent chapters (fig. 8).

d. Wire. Wire circuits are installed by the combat command area support platoon to the combat command trains area and to major supporting or attached units in the combat command area. These circuits are installed in order of priority established by the commander.

e. Supplemental Means.

(1) Messenger service, both scheduled and special, is provided by the combat command to subordinate units. Air messengers may be used.

(2) Visual or sound communication between the combat command and subordinate units is used for identification, warnings, and as directed in the operation orders or the SOI (pars. 11 and 12).

Section II. COMBAT COMMAND COMMUNICATION PLATOON

62. General

a. The combat command communication platoon is organized and equipped to install, operate, and supervise the internal combat command communication system and to perform organizational maintenance on communication equipment of the headquarters and headquarters company. The platoon is composed of a platoon headquarters, a message center and wire section, and a radio section (pars. 13–15).

b. In addition, one platoon from the forward communication company of the division signal battalion is normally placed in support of the combat command (pars. 128–130).

63. Personnel and Duties

a. The platoon leader commands the communication platoon under operational control of the combat command communication officer. The communication platoon leader acts as the assistant combat command communication officer.

b. The communication chief coordinates activities of all personnel in the communication platoon, assists the platoon leader, and maintains records and reports.

c. Message center and wire section personnel include a section chief who operates the message center; message center personnel for message handling and cryptographic service; switchboard operators and wiremen to install, operate, and maintain the local wire system; motor messengers who make scheduled and special

message deliveries; and teletype operators to operate the three organic wire teletype machines.

d. The radio section provides radioteletype operators or CW operators to operate AM radio stations. Radio mechanics assigned to this section perform second-echelon maintenance.

64. Operations

a. In the command post area the message center is the focal point of operations for the combat command communication platoon. The message center and wire section provide message processing service, teletype service, and the switchboard for the wire system terminal. During movement of the combat command a mobile message center is operated by the communication platoon. The wire system within the command post is installed and operated by the message center and wire section personnel. Other supplemental means of communication (such as panel displays) are provided by members of the message center when required.

b. Radioteletypewriter teams and intermediate speed (IS) radio operators are assigned to the operations, intelligence, and logistical staff sections, and remain a part of those sections during field operations. The communication platoon operates a RATT station in a net of the higher headquarters as required. This station may operate with the command group or as an alternate station during operations such as the displacement of the command post.

65. Communication Support

a. The combat command communication platoon has radio mechanics who provide second-echelon maintenance to all elements of the headquarters and headquarters company of the combat command. Normally the communication platoon leader or the communication chief will assign these men to operate from a central location in the command post, but, if necessary, they may be sent to the trains or with the command group.

b. Limited third-echelon maintenance and direct exchange are provided by the forward repair section of the combat command area support platoon of the division signal battalion. This support must be coordinated by the combat command communication officer with the area support platoon leader and the combat command communication platoon leader.

CHAPTER 6

ARMORED DIVISION HEADQUARTERS COMMUNICATION

66. General

The communication system employed to command and control the armored division is quite extensive and often technically complex. This chapter covers the system briefly, but an understanding of the system and facilities it provides requires a study of the armored division signal battalion (ch. 10). The commander of this battalion is also the division signal officer and as such has operational responsibility for signal communication in the whole division.

67. Organization

a. The armored division headquarters conducts combat operations from the main command post and administrative operations from the rear echelon. An alternate command post may be established when required, and a command group may operate from either command post. The main command post is composed of the division commander and staff agencies required for tactical operations, while the division rear echelon contains staff agencies not immediately required for operations. The rear echelon is grouped around the division administration company. Usually the alternate command post is composed of the assistant division commander and representatives of the same staff agencies found in the main command post. The command group is composed of the commander, a small staff, communication facilities, and transportation for highly mobile operations.

b. Further operational organization of division headquarters includes the fire support coordination center (FSCC), for control of all fire support available to the armored division (par. 84), and the division logistics control center (DLCC), for control of logistical matters (par. 103).

68. Headquarters and Headquarters Company, Armored Division

a. General. With a few exceptions, communication equipment organic to the armored division headquarters and headquarters company is limited primarily to FM radio. The bulk of communication facilities available to each echelon of division headquarters is furnished by the command operations company of the armored division signal battalion.

b. Radio (fig. 9).

(1) *Division staff net FM.* This net is used for internal radio communication between staff sections and for control of the headquarters vehicles during marches. The headquarters commandant usually operates the division staff net control station with radio equipment organic to the headquarters company.

(2) *Security platoon command net FM.* This net is used by the division security platoon leader for command and control of security platoon operations in the division headquarters areas. Tanks of the security platoon will also operate in this net when under security platoon control. The platoon leader operates the net control station, and each security squad has a portable armor band FM radio to enter the net. Coordination with the headquarters company commander or the headquarters commandant may be accomplished on this net or on the division staff net.

c. Supplemental Means.

(1) The division signal battalion furnishes division headquarters with equipment for supplemental means of communication. Requirements for special staff sections representing supporting elements are normally furnished from their parent unit, e.g., ordnance, Army aviation, medical, provost marshal. Installations such as wire circuits, message center facilities, and other signal center services are provided by the division signal battalion through its command operations company.

(2) The headquarters company has organic equipment primarily to provide supplemental means of communication to division headquarters for security and similar necessary services.

69. Communication to Higher Headquarters

a. General. Subscribers of the division communicating system communicate with higher headquarters through circuits provided by corps or army.

b. Radio.

(1) *Higher headquarters command net RATT.* This net is used primarily for operational traffic. The division signal battalion provides a high power AM radio, mounted in an APC, in this net. Radioteletype or voice operation is employed in a point-to-point circuit to higher headquarters. This system requires a radio at division head-

quarters and one at higher headquarters (furnished by the higher headquarters), to allow a free flow of information, with automatic cryptographic facilities when operated as RATT. Similar equipment from the signal battalion may be used for additional circuits required during operation of the alternate division command post or during displacement.

(2) *Army logistical net RATT.* Under control of army, this net may operate as a point-to-point circuit or as a controlled net. Normally logistical communication with higher headquarters is accomplished through the area communication system.

(3) *Army air request net RATT.* For processing tactical air requests and coordinating close air support, this net provides radio communication from the division G2 or G3 air at the division FSCC to the army G2 or G3 air at the army operation center. A high power RATT station is provided by the division signal battalion to operate in this net from the armored division to the field army.

(4) *Fire support nets to higher headquarters.* Detailed discussions of tactical air support nets and fire control nets are found in chapters 2 and 7 respectively.

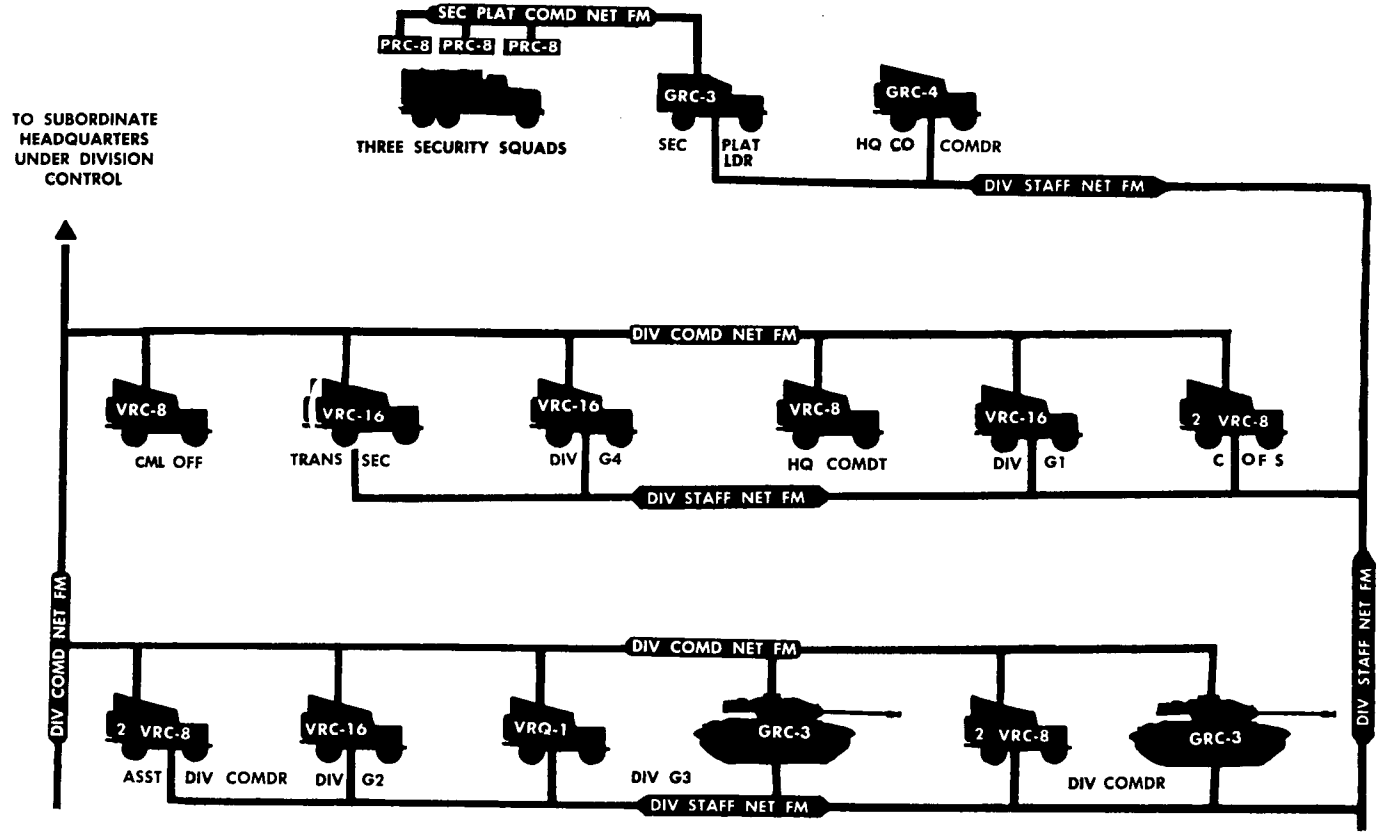
70. Communication to Adjacent Organizations

Communication with adjacent organizations is through the facilities of the division, corps, and army communication systems. Liaison officers with radio equipment are normally exchanged with adjacent organizations. The division commander and staff may enter the FM command net of adjacent organizations for coordination purposes.

71. Division Radio Nets

(fig. 10)

a. Division Command Net RATT. The division command net RATT is used for transmission of operational information between the division and its elements, including division artillery, the combat commands, the armored cavalry squadron, the engineer battalion, and the aviation company. Other elements of the division and attached units from higher headquarters may be required to enter this net. This net operates under control of the division G3, with equipment and personnel for the net control station furnished by the division signal battalion. When the command group is formed, the G3 may operate in this net employing organic equipment mounted in the APC assigned to the division operations section from the division headquarters company. Equipment for the division alternate command post is furnished by the division signal battalion.


SEC PLAT COMD NET FM
PRC-8
PRC-8
PRC-8
THREE SECURITY SQUADS
GRC-3
SEC
PLAT LDR
GRC-4
HQ CO
COMDR
DIV STAFF NET FM
TO SUBORDINATE HEADQUARTERS UNDER DIVISION CONTROL
DIV COMD NET FM
VRC-8
CML OFF
VRC-16
TRANS
SEC
VRC-16
DIV
G4
VRC-8
HQ COMDT
VRC-16
DIV
G1
2 VRC-8
C
OF S
DIV STAFF NET FM
DIV COMD NET FM
DIV COMD NET FM
2 VRC-8
ASST
DIV COMDR
VRC-16
DIV
G2
VRQ-1
GRC-3
DIV G3
2 VRC-8
GRC-3
DIV COMDR
DIV STAFF NET FM
DIV STAFF NET FM

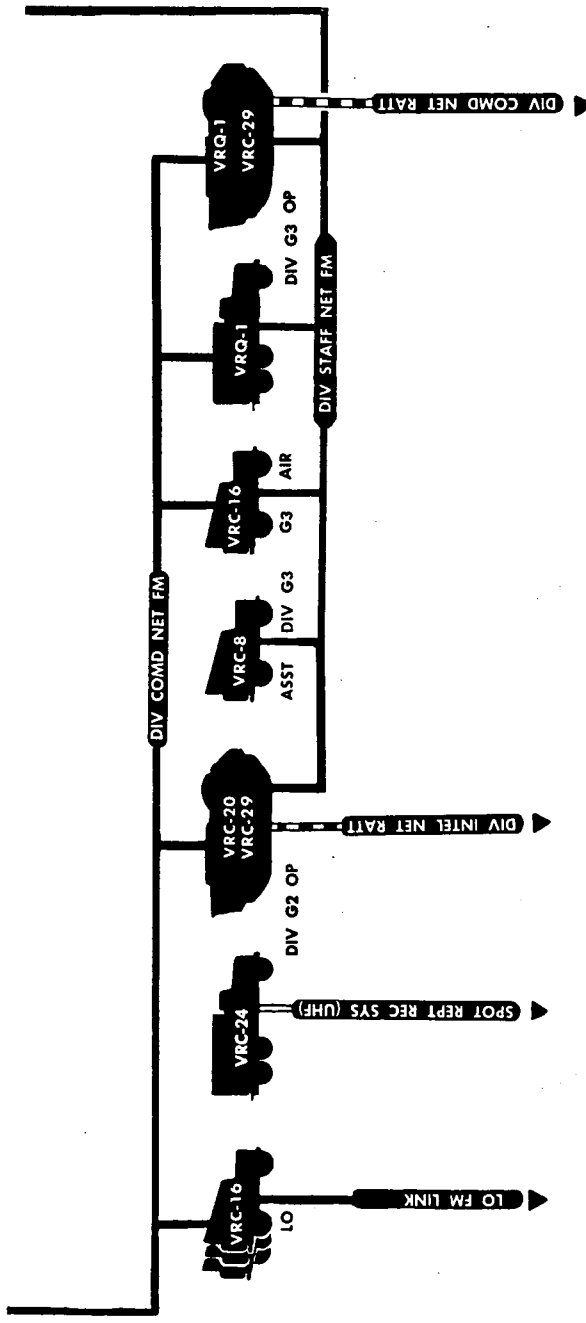


Figure 9. Type radio net diagram, armored division headquarters and headquarters company.

b. Division Intelligence Net RATT. This net is used primarily for transmission of intelligence information, but it may be used also as an alternate route for other matters. The net control station, at the division command post, is furnished and operated by the division signal battalion, under operational control of the division G2. The G2 section has an organic APC and the necessary equipment for operating with the command group and other stations as discussed in *a* above.

c. Division Logistical Net RATT. This is used for transmission of administrative and logistical information between division headquarters elements and subordinate units. Operational control is exercised by the G4, either from the division main command post or from the DLCC. Equipment, which consists of medium power AM radios in wheeled vehicles, and personnel for operating the net control station are provided by the division signal battalion. Elements of the division operating in the net normally include the division main command post, DLCC, division trains, combat command command posts and trains, battalions (except the signal battalion), and the armored cavalry squadron. Other units in the division and attached or supporting nondivisional units may enter the net as required, but division units such as division artillery and the aviation company do not have equipment for continuous operation in logistical nets. For additional discussion of this net, see paragraph 104.

d. Division Rear Echelon Net RATT. This net operates as a point-to-point circuit between the division main command post and the division rear echelon. The system operates as a free net and is used by the G1 and AG, with a capability of handling large volumes of administrative traffic between the two echelons of division headquarters. This two-station net operates with personnel and vehicular-mounted high power RATT equipment furnished by the division signal battalion.

e. Division Air Request Net AM. This net is used for processing tactical air support requests from combat command, battalion, and squadron to the division FSCC. The net control station at the FSCC is furnished by the division signal battalion and is under the control of the division fire support coordinator. This net is the primary means for immediate air requests, but may be used for preplanned requests.

f. Division Warning Broadcast Net AM. Information of an immediate and urgent operational nature, applying to the division as a whole or to a major part of the division, which requires no immediate receipt or reply may be transmitted on this net. This type of information normally includes air, CBR, nuclear strike, and fallout warnings, and similar information. Division artillery is

responsible for transmitting air warnings, but in an emergency, subordinate divisional units with AM transmitters may switch equipment to this net for broadcast of essential information. For example, the armored cavalry squadron may broadcast reconnaissance information or warnings to the division. This net consists of a transmitter at the division FSCC, furnished by the division signal battalion, a transmitter at division artillery headquarters, and AM receivers organic to all elements of the division, from separate company or battalion level units up to major commands.

g. Division Command Net FM. This net provides direct and personal contact among the division commander, members of his staff, and subordinate commanders. Major subordinate operations sections monitor this net, but the net usually includes the division commander, the assistant division commander, the division artillery commander, the division operations section, general staff members, major subordinate commanders, and liaison officers from division to higher and adjacent organizations. Personnel operating in this net employ organic equipment, but the division signal battalion and the division aviation company may augment facilities for use in this net. These facilities include special antenna equipment, automatic retransmission systems, aerial relay stations, and radio-wire integration into the division area communication system at any division signal center.

72. Division Radio Relay and Wire Systems

a. General. The division signal battalion has a limited wire and cable capability, and employs radio relay extensively as the primary method of trunk-line communication throughout the division area communication system. When extensive wire trunk systems are required, the signal battalion will request support from higher headquarters. Switchboard facilities at each echelon of the division headquarters are provided by the division signal battalion, and telephone service is furnished locally over field wire lines. Trunk facilities between echelons of the headquarters and subordinate elements are primarily radio relay, backed up by limited field cable. The division area communication system may be entered at any signal center by the establishment of FM radio-wire integration. Both telephone and teletypewriter services are provided over this system (fig. 21).

b. Wire Communication to Higher Headquarters. The next higher headquarters is responsible for wire communication from that headquarters to the division. However, it is only through constant coordination between all signal units concerned that adequate wire comunication may be maintained. Radio relay facilities furnished by higher headquarters that are normally terminated at

the division main and trains signal centers provide the primary link to higher headquarters.

c. Wire Communication to Subordinate and Adjacent Headquarters. Wire or cable circuits are seldom actually installed between the armored division signal centers or to adjacent organizations. Again radio relay is the normal method of operation, but the division signal battalion does have a limited capability to establish such circuits.

73. Messenger Service

a. Scheduled messenger runs are established as normal procedure by the division signal battalion. Maximum use is made of the scheduled service so that special messenger capability is conserved to expedite high-precedence message traffic. The division aviation company provides aircraft for air messenger service. Service is from higher to subordinate echelons, but subordinate units may employ special messengers to higher headquarters.

b. Messengers operating from the division headquarters signal center make deliveries directly to the message centers of major divisional elements as well as to other signal centers.

74. Sound and Visual Signals

Sound and visual signals are employed by the division headquarters primarily for internal communication. Discussion of these means of communication are found in paragraphs 11 and 12.

DIVISION ELEMENTS	Div Comd Net FM	Div Comd Net RATT	Div Intel Net RATT	Div Log Net RATT	Div Air Req Net AM	Div Wng Bcst Net AM	Entry into Div Area Comm Sys
Comd Gp	X	X	X			X	*
Main CP	NCS	NCS	NCS	X			X
Altn CP	X	X	*	*		X	X
Div Rear Ech						X	*
FSCC (at Div Main)					NCS	NCS	X
FDC/Div Arty Hq	X	X	*	*		X	X
DLCC	*			NCS		X	X
Div Tn		*				X	X
Combat Command	X	X	X	X	X	X	X
Armor Bn				X	X	X	*
Armd Inf Bn				X	X	X	*
Armd Cav Sq	X	X	X	X	X	X	*
Engr Bn	X	X	X	X		X	*
Med Bn	*			X		X	*
Ord Bn	*			X		X	*
QM Bn	*			X		X	*
Avn Co	X	X	*	*		X	*
MP Co/PM Sec	X					X	*

* AS REQUIRED

Figure 10. Chart of armored division radio nets.

CHAPTER 7

ARMORED DIVISION ARTILLERY COMMUNICATION

Section I. GENERAL

75. General

In support of armor operations, artillery units must have a communication system that provides means for command, control, and coordination of all supporting fires available to the armored division. Control of artillery depends on close liaison with the supported, reinforced, and adjacent units, and on dependable communication facilities. The communication system employed by the armored division artillery is designed specifically to meet these requirements, whether artillery units are under centralized or decentralized control. In the armored division artillery, flexibility is dependent upon speed and reliability of the communication system characteristics that directly affect rapid concentration, transfer, maneuver, and distribution of fires (techniques required for adequate artillery support). Highly mobile operations add to the need for a flexible and reliable communication system between artillery elements, which must be as mobile as the units to which they furnish support.

76. Artillery Communication Means

Radio, wire, and messenger are the principal means of communication employed by armored artillery, supplemented by sound and visual means. Thus, as in the case of other armor units, all means of communication are employed by artillery units. Again both speed and flexibility of communication are of paramount importance to armor operations to provide first support immediately responsive to the tactical commander.

77. Artillery Liaison

a. Command liaison is habitually required in artillery units. The best example of command liaison is the liaison between the direct support artillery battalion commanders and the combat command commanders. The artillery commander works with the supported combat command commander and staff; further, the artillery maintains a senior liaison officer with the combat command during operations. In addition to liaison at combat command, each direct support battalion has three organic liaison sections that work with battalion-level armor units. In practice, these liaison sections remain with the supported battalion regardless of the supporting artillery unit.

b. Liaison is established from supporting artillery to the supported armor unit, from battalion or squadron level up. The artillery liaison officer acts as the fire support coordinator for the supported unit at battalion level, in addition to normal artillery liaison duties. To insure effective coordination between artillery units, liaison is also established from reinforcing artillery units to reinforced artillery and, as the artillery commander directs, laterally. Air defense artillery units in support of the armored division artillery also establish liaison as required.

78. Artillery Command Posts

a. The armored artillery command post and fire direction center (FDC) are usually located in the same general area. The factors considered in selection of this area are the same as those used by other armor units for command post location. The most important factor influencing the selection, so far as artillery communication is concerned, is the requirement to exercise control of subordinate units. This requirement implies a need for the CP-FDC to be centrally located in relation to firing elements, while maintaining close liaison and communication with the supported or reinforced unit.

b. At the armored division artillery headquarters, an additional command grouping, the FSCC, operates near the division main command post. The same general requirements specified above apply to the FSCC.

79. Artillery Communication Principles

Communication principles for armored artillery are the same as those discussed in paragraph 5 with the addition of one: a unit reinforcing the fires of another unit is responsible for establishing and maintaining communication with the reinforced unit.

80. Tactical Application of Artillery Communication

a. General. Tactical communication techniques are similar to those employed by armor units; however, when the tactical situation permits, extensive use of wire is highly desirable to armored artillery at all levels. Thus more equipment, personnel, and training are applied to the use of wire. For example, within the firing battery, wire is in reality the primary means of communication.

b. Radio. In that artillery units of divisions and higher organizations employ compatible FM radios, the coordination between artillery units from different major organizations presents little or no problem for radio communication purposes. In emergency this artillery radio capability may provide an additional communication link between armor and pure infantry organizations.

c. Wire.

(1) When the situation and time available permit, wire circuits are planned and implemented to parallel radio circuits at all levels. Wire circuits are installed and expanded, but radio contact is maintained on listening silence as backup to wire.

(2) It is highly desirable for advance or reconnaissance parties to establish wire nets in new positions before the arrival of armored artillery elements. The extent of wire circuits installed depends on the artillery commanders desires, time, personnel, and equipment available in each situation. It is normal to take over available existing wire circuits and to recover wire as practicable. Prevention of destruction of wire circuits by tracked vehicles must be planned and built into the system.

d. Area Communication. Generally armored artillery units tie into the division area communication system for communication over long distances. The division signal battalion will establish a signal sub-center at or near division artillery and install cable to the division artillery switchboard. Personnel from artillery units will lay wire to signal centers and use available facilities. Specifically, sole-user circuits provided by the division area communication system are used for fire control purposes, while common-user circuits are used for administration and logistical traffic. Because of this extensive use of the area system, armored artillery communication personnel must have detailed knowledge of location, displacement, and future plans of all division area signal centers.

81. Survey Communication

Artillery survey provides timely survey control to the firing units and target-locating installations. Survey parties are employed througtout the area of operation. Interparty communication is required as well as communication with adjacent, higher, and subordinate units. To facilitate this process, compatible equipment and frequencies are used from corps level down to firing batteries. Thus all survey sections in armored artillery employ the *corps artillery survey net FM,* even though actual distance between elements using the net frequently prevents contact between units. In actual practice the system enables survey teams to coordinate and exchange information in futherance of their mission.

82. Communication Support

a. Communication Officers. Division artillery headquarters and each artillery battalion has a communication officer and an assistant communication officer. Duties and functions of these officers closely resemble those of the combat command communication officers in that the communication officer is a member of the artillery commander's staff and charged with supervision of communication. The assistant communication officer is also platoon leader of the organic communication platoon.

b. Communication Platoons.

(1) Communication platoons in the division artillery headquarters battery and in each artillery battalion headquarters battery are composed of equipment and personnel required for the installation, operation, and maintenance of a message center, radio system, and wire system. Radio operators (in most cases) are assigned directly to the sections as required. Other communication support functions are performed as normal to most armor organizations.

(2) With added emphasis on wire communication common to artillery units, additional equipment and personnel are assigned to the artillery communication platoons. This emphasis on wire communication requires that all personnel must be thoroughly trained in field wire techniques.

c. Radar. Radar is maintained by communication platoons in most armor units. However, in armored artillery the equipment, operators, and radar mechanics are found in appropriate surveillance or radar sections.

Sestion II. ARMORED DIVISION ARTILLERY HEADQUARTERS

83. General

a. Division artillery operates in two general echelons: the fire support coordination center (FSCC) and the command post fire direction center (FDC). The FSCC provides the commander with an agency through which fires of all available fire support elements are coordinated and integrated with the plans of maneuver. The FDC provides a means for tactical employment and control of artillery firepower.

b. The armored division commander controls division artillery through the division artillery commander, who acts as his fire support coordinator. The division artillery commander controls

artillery through the division artillery FDC, and coordinates all fires through the FSCC.

84. Division Fire Support Coordination Center Communication

a. General. The area communication system is the primary link for communication from the FSCC to the armored division and to adjacent or higher FSCC's. This link is facilitated by provisions within the area communication system of sole-user circuits to subordinate artillery units and direct entry by sole-user circuits into the area system of higher headquarters. The FSCC is normally located near G2 and G3 operations, with telephone and direct liaison providing contact with division main. Informal FSCC's may be established at combat command by the supporting artillery battalion commander.

b. Radio. Control and coordination of subordinate elements from the FSCC is provided by equipment operated in the *division artillery command/ intelligence net RATT,* the *division artillery command/fire direction net FM,* and the *division air request net AM.* (Communication for close air support is described in detail in paragraphs 33–36.) In addition, an AM radio is operated in the *division warning broadcast net AM.* When transmissions are necessary from FSCC in this net the radio in the command/intelligence net may be temporarily switched to the warning broadcast net.

85. Division Artillery Headquarters and Fire Direction Center Communication

a. General. The command operations company of the division signal battalion ties the armored division artillery headquarters (including the FDC) into the division area communication system, to provide communication with FSCC and other subscribers in the area communication system. Initially this link is by radio relay and further paralleled by wire or cable. With additional support from the division signal battalion, the division artillery headquarters may be designated (in an emergency) as an alternate division command post.

b. Radio (fig. 11).

(1) *Net control.* Net control stations for division-level artillery nets are in the FDC area. The FDC consists of operations, intelligence, and communication personnel and equipment, which provide the means by which the artillery commander directs artillery fire. The remainder of the headquarters battery completes the organization of the command post area, which supports operations of division artillery.

(2) *Nets to higher headquarters.*

(*a*) *Corps artillery fire direction net RATT* is the radio link from corps artillery to division artillery. The station operating in this net is located in the division artillery FDC. Coordination and fire request information are transmitted in this net.

(*b*) *Air defense intelligence net AM* is monitored by a receiver in the operations section and, when required, information received is rebroadcast to division elements on the division warning broadcast net AM. Attached artillery air defense organizations also operate stations in this net.

(*c*) The *corps artillery meteorological net AM* is used by the field artillery target acquisition battalion and each division artillery to transmit meteorological data. Messages will be transmitted on a schedule as announced by the net control station (field artillery target acquisition battalion). Receiving stations will use the data from the transmitting station nearest their positions.

(*d*) *The time signals net AM,* established by theater, is monitored on a receiver provided in the survey information center (SIC) and, if necessary, time signals are rebroadcast to subordinate units.

(*e*) *The division command net FM* provides contact between the division artillery commander and the division commander and his staff.

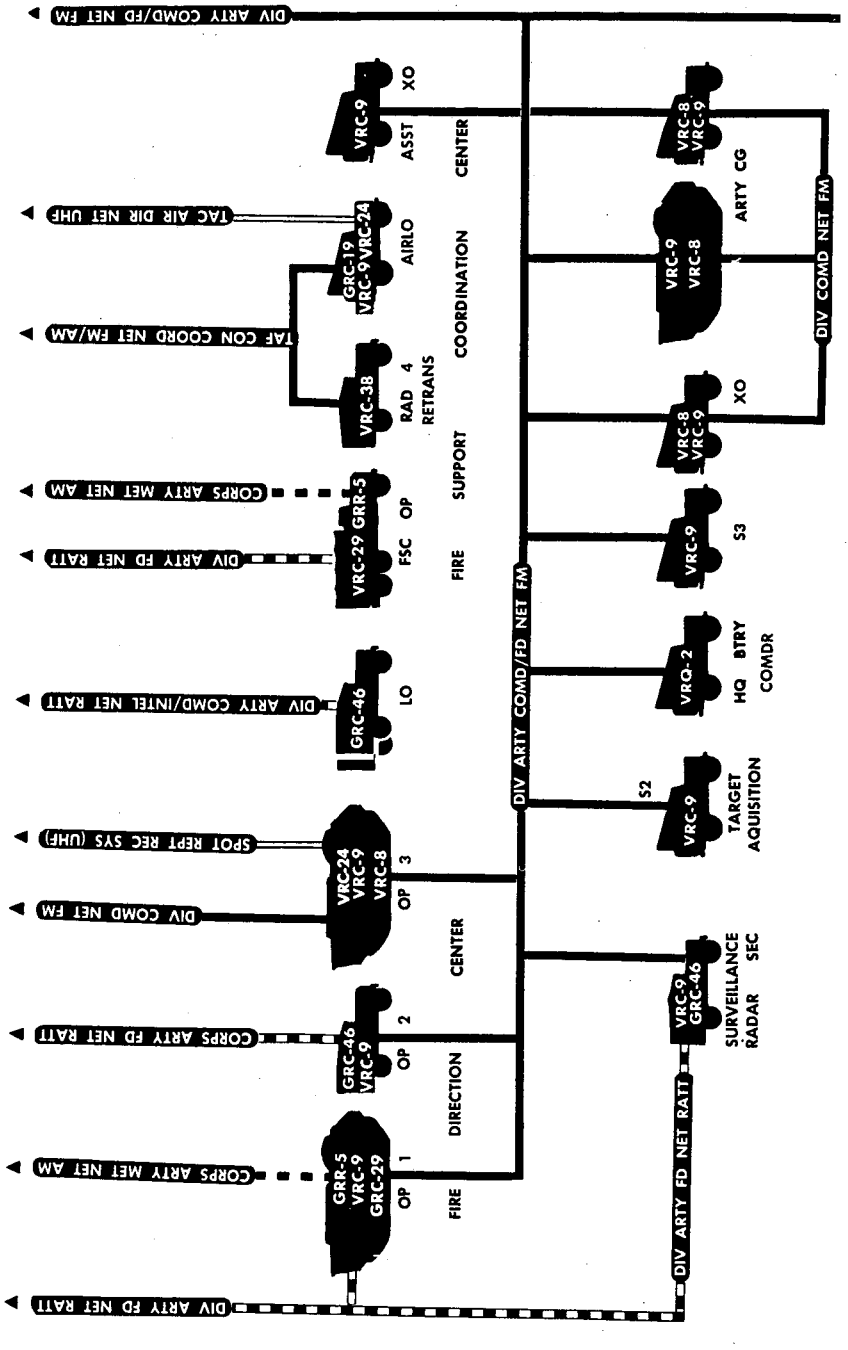
(*f*) *The division command net RATT* provides extended communication with various other members of the net and the division artillery headquarters.

(*g*) *The division warning broadcast net AM* is used by division artillery to receive various types of warnings and to transmit air defense warnings to elements of the division.

(3) *Internal artillery radio nets.*

(*a*) *The division artillery fire direction net RATT* will be used for transmission of fire requests from battalions to division artillery. Fire missions from division artillery to the battalions or batteries retained under its control, including time-on-target missions, may be transmitted by voice or RATT. The division artillery S3 has operational control of this net.

(*b*) *The division artillery command/intelligence net RATT* is used for tactical control of subordinate battalions and for transmissions of target information. This net, which is under operational control of the division artil-


DIV ARTY COMD/FD NET FM
VRC-9
XO
ASST
CENTER
TAC AIR DIR NET UHF
GRC-19
VRC-9
VRC-24
AIRLO
TAF CON COORD NET FM/AM
VRC-38
RAD 4
RETRANS
COORDINATION
CORPS ARTY MET NET AM
VRC-29
GRR-5
FSC
OP
DIV ARTY FD NET RATT
FIRE
SUPPORT
DIV ARTY COMD/INTEL NET RATT
GRC-46
LO
SPOT REPT REC SYS (UHF)
VRC-24
VRC-9
VRC-8
OP
3
DIV COMD NET FM
CORPS ARTY FD NET RATT
GRC-46
VRC-9
OP
2
CENTER
CORPS ARTY MET NET AM
GRR-5
VRC-9
GRC-29
OP
1
DIRECTION
DIV ARTY FD NET RATT
DIV ARTY COMD/FD NET FM
VRC-8
VRC-9
ARTY CG
VRC-9
VRC-8
DIV COMD NET FM
VRC-8
VRC-9
XO
VRC-9
S3
VRQ-2
HQ BTRY
COMDR
S2
VRC-9
TARGET
AQUISITION
VRC-9
GRC-46
SURVEILLANCE
RADAR
SEC

NOTE: Division artillery headquarters may operate stations in the division intelligence and logistical nets RATT when required, using radio sets normally operated in other nets.

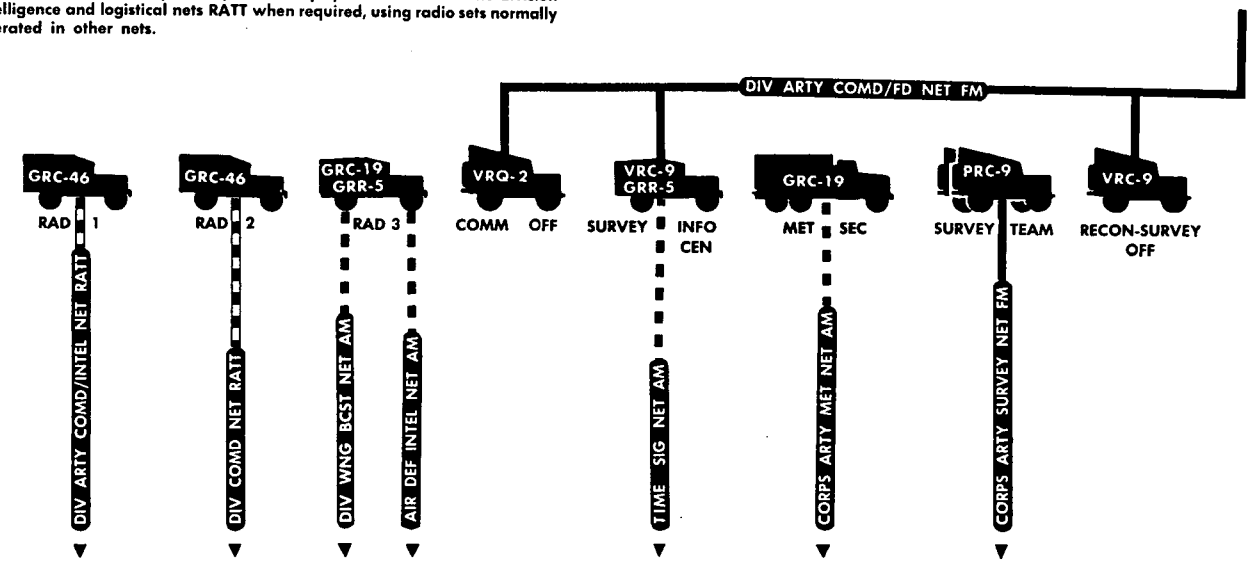


Figure 11. Type radio net diagram, headquarters and headquarters battery, armored division artillery.

lery S3, is used also by the assistant executive officer at FSCC and the two liaison officers. When traffic permits, this net is used for administrative and logistical information.

(*c*) *The division artillery command/fire direction net FM* provides communication between elements of the headquarters, with aircraft in support of division artillery, and, when distance permits, to subordinate battalions and batteries retained under division artillery control.

Section III. ARMORED DIVISION FIELD ARTILLERY BATTALIONS

86. General

The application of principles and techniques outlined for artillery in preceding sections apply generally to armored artillery battalions. Because of the inherent mobility of armor operations, as the level of armor command drops below combat command, the opportunity for use of wire between artillery units and the supported armor units will decrease rapidly. While wire is used extensively by artillery units, coordination of fires with tactical units must be primarily by radio, messenger, or direct liaison.

87. External Use of Wire

a. Each direct support battalion installs wire to the nearest signal center for entry into the division area communication system. At the same time a direct line is normally laid to the supported combat command.

b. Wire communication to artillery liaison officers with battalion task forces is the responsibility of the artillery battalion. The liaison officers are responsible for installing lines to forward observers under their control.

88. Internal Use of Wire

If possible, wire communication from the battalion to the battery executive officers command post is installed prior to the occupation of a position. Initially, upon occupation of a battery position where wire has not been previously installed, communication from battery executive officer command post to individual gun positions will be by voice, messenger, and visual signal. In any case, wire will be used for intercommunication as soon as it can be installed.

89. Radio

a. General. Batteries of armored artillery do not employ internal radio nets. Individual armored artillery pieces do not have radios; thus, internal communication is accomplished by using wire as outlined above. The battery operates radios in the battalion nets and corps artillery survey net, and monitors the division warning broadcast net.

b. Direct Support Artillery Battalion Nets (fig. 12)

(1) To provide the most efficient and flexible radio communication possible between firing batteries, FDC's, liaison sections, and forward observers, fire direction nets are controlled by the fire direction officer. Armored artillery

battalion SOP's should have a definite prearranged procedure covering the use and shifting of stations in these nets for normal operations. Air observers employ nets as directed by the FDC.

(2) *The artillery battalion command/fire direction net FM* is employed for control of subordinate batteries and for control within the batteries. It provides a radio link between the commander and his subordinates, his FDC and battery executive officer's command post liaison sections, radar section, and aircraft. When traffic permits, this net may be used for logistical purposes.

(3) *Fire direction net 1 FM* provides communication for initial fire requests from forward observers (FO) under control of liaison officer number 1 to battalion and from battalion to Battery A. *Fire direction net 2 FM* is employed similarly by liaison officer number 2 and Battery B, while *fire direction net 3 FM* is employed by liaison officer number 3 and Battery C.

c. Field Artillery Battalion, 155-mm, 8-inch Howitzer, 762-mm Rocket, Self-Propelled (Rocket/Howitzer) Net FM (fig. 13).

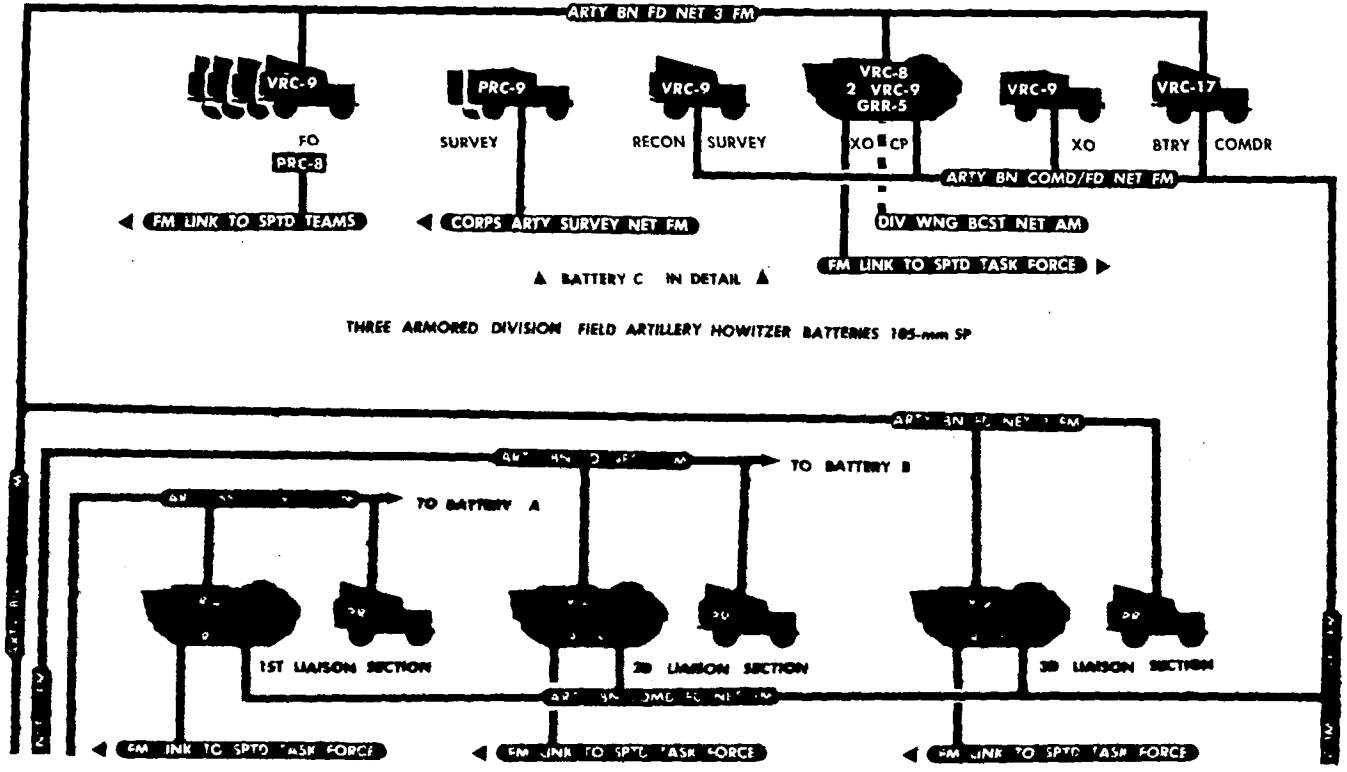
(1) With the exception of the fire direction nets discussed below, communication in the rocket/howitzer battalion is generally the same as that in the direct support battalions. Because elements of this battalion normally function in a general support or reinforcing role, requests for all artillery fire missions from tactical units are channeled through the direct support battalions. Nets are controlled by the fire direction center as previously discussed.

(2) *Fire direction net FM* is used for the transmission of fire missions from FO's organic to the 155-mm and 8-inch howitzer batteries to battalion FDC, and from battalion to batteries.

90. Service Battery Communication

a. The principal means of communication employed by service batteries organic to the direct support battalions and the rocket/howitzer battalion is wire. Elements of these batteries are located where they may best support the parent organization. Although only two men are available for wire operations, the service battery installs its own internal wire system. A wire team from the battalion communication platoon installs a circuit from the battery to the battalion switchboard. This circuit may be through the area communication system.

b. The service battery commander's ¼-ton truck and command post vehicle each have an FM radio for entry into the *battalion command fire direction net FM.* In addition, the command post vehicle has an AM receiver that monitors the *division warning broadcast net AM.*


ARTY BN FD NET 3 FM
VRC-9
FO
PRC-8
FM LINK TO SPTD TEAMS
PRC-9
SURVEY
CORPS ARTY SURVEY NET FM
VRC-9
RECON
SURVEY
VRC-8
2 VRC-9
GRR-5
XO
CP
DIV WNG BCST NET AM
FM LINK TO SPTD TASK FORCE
VRC-9
XO
VRC-17
BTRY
COMDR
ARTY BN COMD/FD NET FM
▲ BATTERY C IN DETAIL ▲
THREE ARMORED DIVISION FIELD ARTILLERY HOWITZER BATTERIES 105-mm SP
TO BATTERY B
TO BATTERY A
1ST LIAISON SECTION
2D LIAISON SECTION
3D LIAISON SECTION

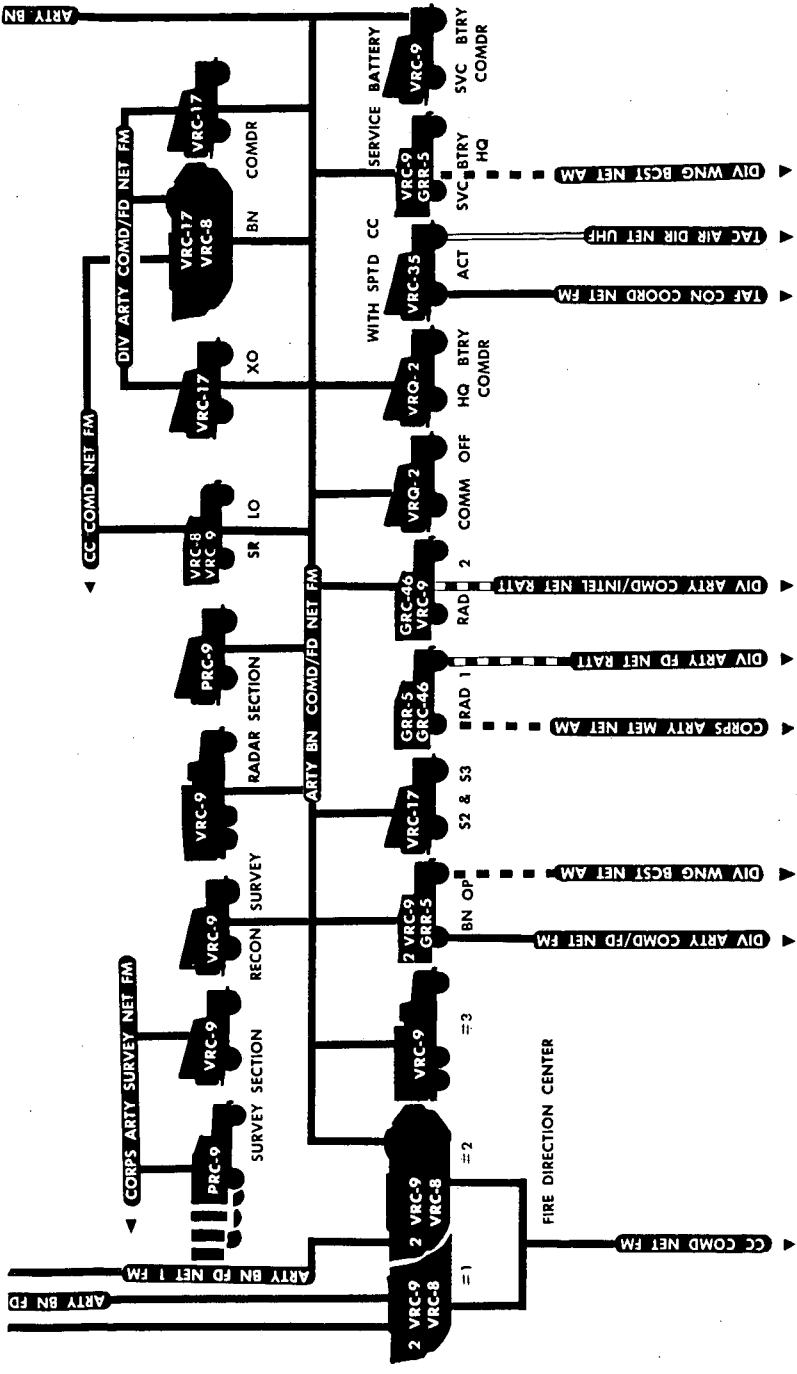
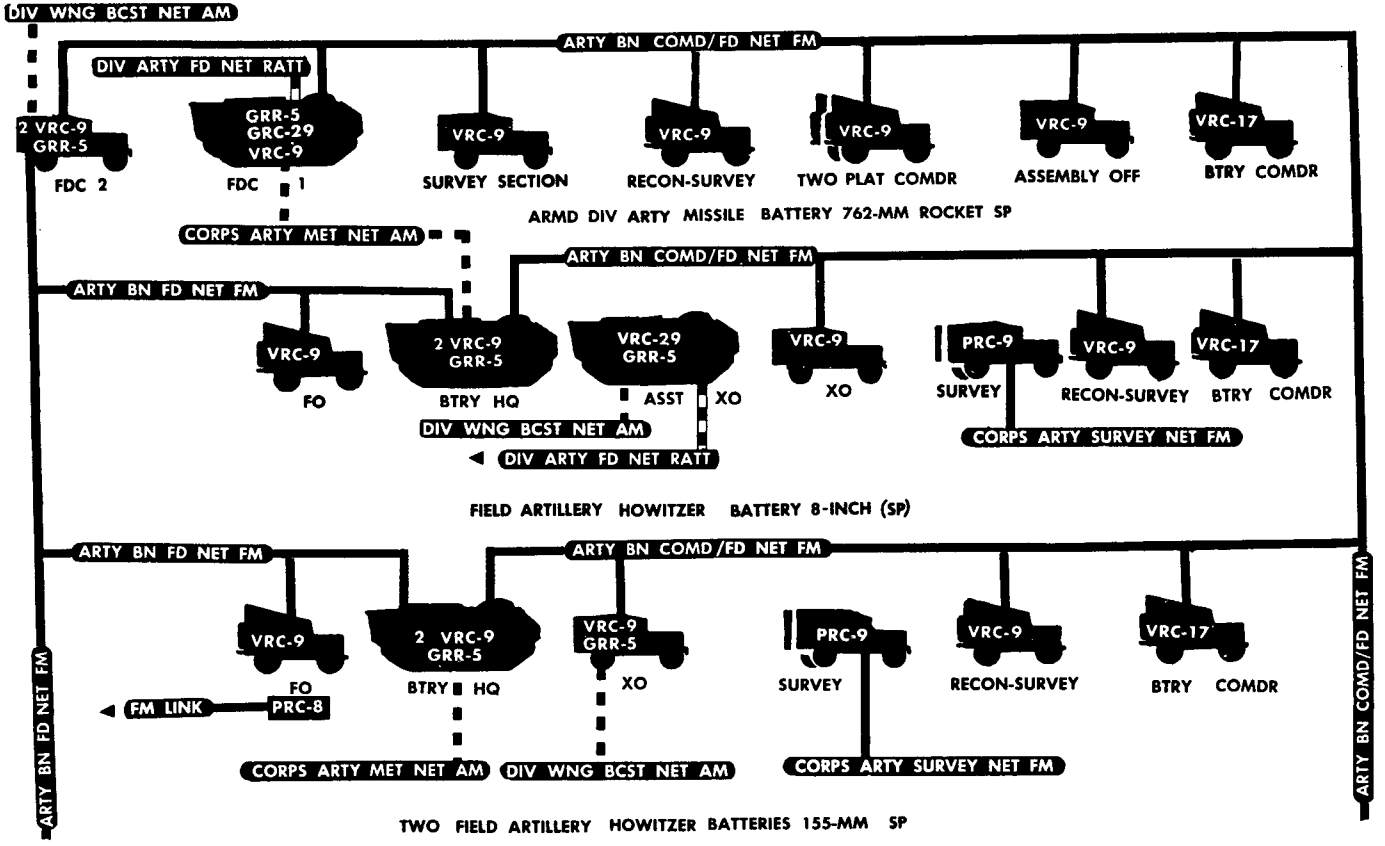


Figure 12. Type radio net diagram, field artillery howitzer battalion 105-mm, self-propelled.


DIV WNG BCST NET AM
ARTY BN COMD/FD NET FM
DIV ARTY FD NET RATT
2 VRC-9
GRR-5
FDC 2
GRR-5
GRC-29
VRC-9
FDC 1
VRC-9
SURVEY SECTION
VRC-9
RECON-SURVEY
VRC-9
TWO PLAT COMDR
VRC-9
ASSEMBLY OFF
VRC-17
BTRY COMDR
ARMD DIV ARTY MISSILE BATTERY 762-MM ROCKET SP
CORPS ARTY MET NET AM
ARTY BN COMD/FD NET FM
ARTY BN FD NET FM
VRC-9
FO
2 VRC-9
GRR-5
BTRY HQ
VRC-29
GRR-5
ASST
XO
DIV WNG BCST NET AM
DIV ARTY FD NET RATT
VRC-9
XO
PRC-9
SURVEY
VRC-9
RECON-SURVEY
VRC-17
BTRY COMDR
CORPS ARTY SURVEY NET FM
FIELD ARTILLERY HOWITZER BATTERY 8-INCH (SP)
ARTY BN FD NET FM
ARTY BN COMD/FD NET FM
VRC-9
FO
FM LINK
PRC-8
2 VRC-9
GRR-5
BTRY HQ
VRC-9
GRR-5
XO
PRC-9
SURVEY
VRC-9
RECON-SURVEY
VRC-17
BTRY COMDR
CORPS ARTY MET NET AM
DIV WNG BCST NET AM
CORPS ARTY SURVEY NET FM
ARTY BN FD NET FM
ARTY BN COMD/FD NET FM
TWO FIELD ARTILLERY HOWITZER BATTERIES 155-MM SP

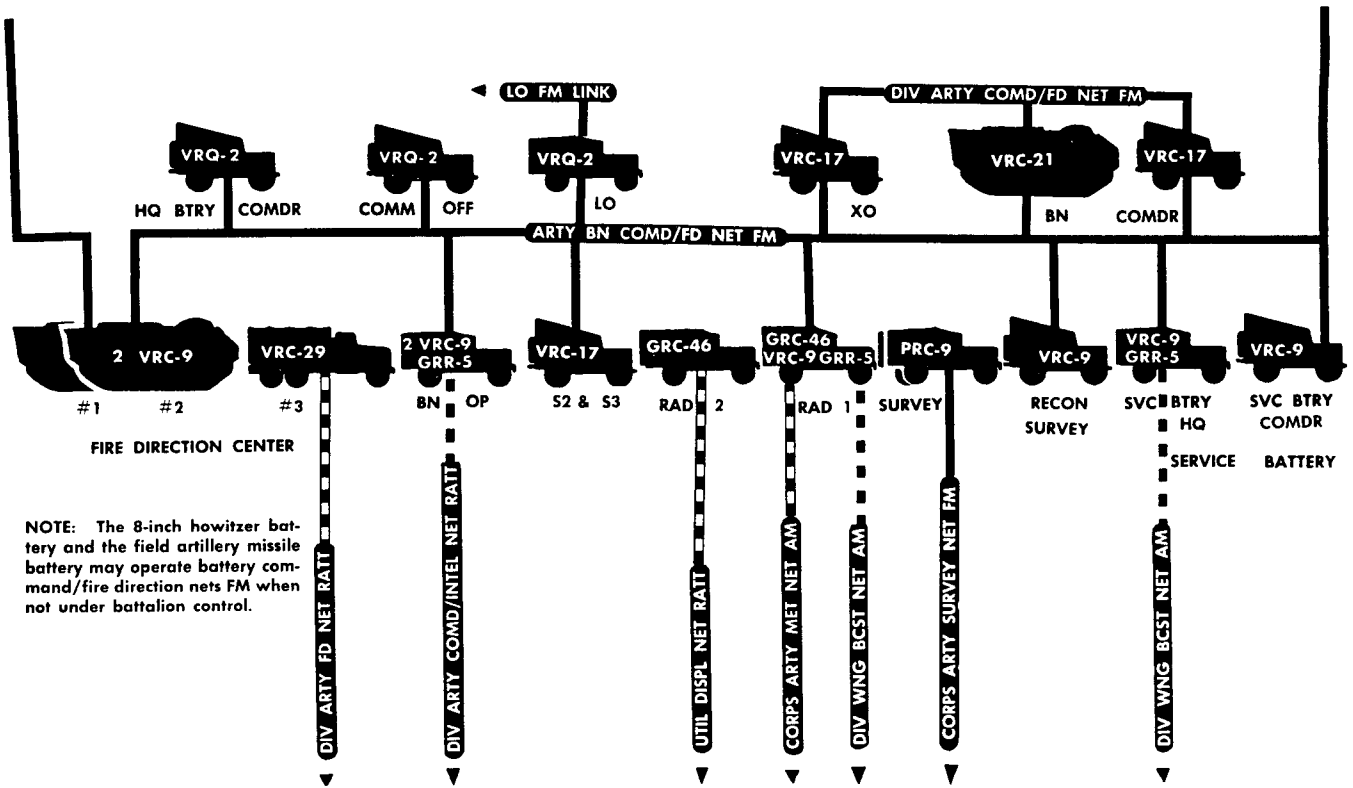


Figure 13. Type radio net diagram, field artillery rocket/howitzer battalion, self-propelled, armored division.

CHAPTER 8

ARMORED DIVISION ENGINEER BATTALION COMMUNICATION

Section I. BATTALION HEADQUARTERS

91. General

The communication system employed by the armored division engineer battalion is designed to provide command, control, and coordination of its organic companies, which are normally employed throughout the division area. Normally one armored engineer company, reinforced by a platoon of the bridge company, is placed in support of or attached to each combat command. A platoon of the armored engineer company, plus a bridge section, is in turn placed in support of the battalion task forces. The engineer battalion headquarters retains control of any remaining elements of the battalion for general support of the division. AM radio providing voice and radiotelegraph (CW) operation is employed for extended ranges, backed up by the shorter range FM radio. Supplemental means of communications are used as in other elements of the division and added emphasis is placed on use of the armored division area communication systems.

92. Employment of Communication Means

a. Radio (fig. 14).

(1) *Division nets.* Communication to division headquarters is accomplished from battalion headquarters on three RATT nets: the *division command net, logistical net,* and *intelligence net RATT.* The battalion headquarters is usually located near division main. Therefore, FM radio contact is possible in the *division command net FM* by the battalion operations section and the battalion commander. The communication section maintains a receiver in the *division warning broadcast net AM.*

(2) *Engineer battalion command net AM.* Internal communication for the armored division engineer battalion is provided by the *battalion command net AM* for maintaining contact between elements of the battalion over the extended ranges expected during normal operations. Command, intelligence, and logistical traffic is carried on this AM net, which constitutes the primary communication system for the battalion, by voice or CW as required. Members of the battalion headquarters who need

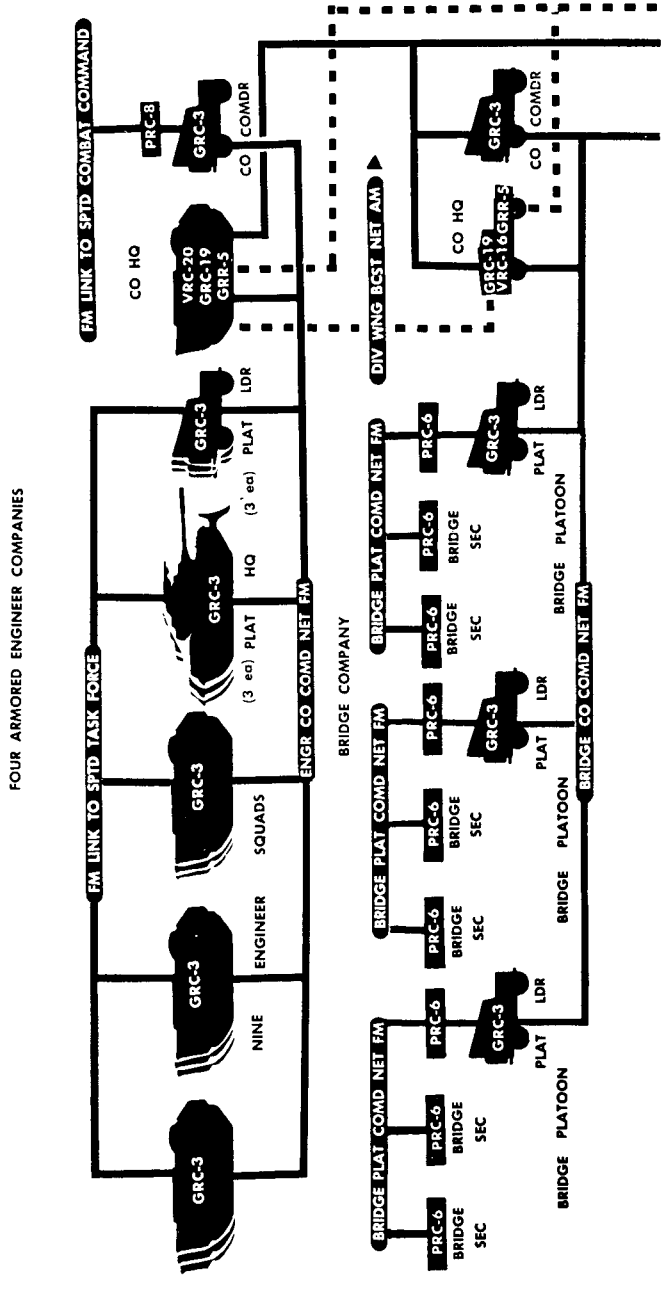
to maintain contact with subordinate elements are provided AM radios. The division engineer section that is in the division main command post as part of the division special staff also is provided with an AM radio.

(3) *Engineer battalion command net FM.* This FM net provides communication from the battalion commander and his operations and intelligence section to each of the companies. To reduce the traffic on the AM command net and when the range of FM radio permits, this net provides an additional voice communication link between elements and furnishes the battalion commander with a personal voice link for command and control.

b. Supplemental Means of Communication. The armored division engineer battalion uses the division area communication system extensively. The widely dispersed operations of an armored division engineer battalion precludes extensive use of organic wire for communication between elements of the battalion and therefore the division area communication system is used extensively. As the situation permits, wire equipment is used for internal communication in the battalion headquarters and in support of specific engineer projects, with both sound-power and battery-power telephones. Because messengers are not specifically assigned to the battalion, personnel must be trained in messenger techniques, especially for handling bulky materials. Sound and visual signals are employed for the same purposes that they are employed in other armor units. See FM 21–60.

93. The Battalion Communication Section

a. General. Unlike in most other armor organizations and primarily because of the method of operation of the battalion headquarters, radio operators are assigned directly to the staff sections rather than to the battalion communication section. The battalion communication section consists of a communication chief, radio operators, radio mechanics, and wire and message center personnel, plus equipment required to support normal engineer operations. The communication officer is assigned to the battalion staff; he supervises this section, makes plans, and performs the same kind of duties expected of communication officers in other armor units.


FOUR ARMORED ENGINEER COMPANIES
FM LINK TO SPTD TASK FORCE
FM LINK TO SPTD COMBAT COMMAND
CO HQ
PRC-8
GRC-3
CO COMDR
VRC-20
GRC-19
GRR-5
GRC-3
LDR
PLAT
HQ
(3 ea)
GRC-3
(3 ea) PLAT
GRC-3
NINE
ENGINEER
SQUADS
ENGR CO COMD NET FM
BRIDGE COMPANY
DIV WNG BEST NET AM
CO HQ
GRC-19
VRC-16
GRR-5
GRC-3
CO COMDR
BRIDGE PLAT COMD NET FM
PRC-6
BRIDGE
SEC
PRC-6
BRIDGE
SEC
GRC-3
PLAT
LDR
BRIDGE PLATOON
BRIDGE CO COMD NET FM
BRIDGE PLAT COMD NET FM
PRC-6
BRIDGE
SEC
PRC-6
BRIDGE
SEC
GRC-3
PLAT
LDR
BRIDGE PLATOON
BRIDGE PLAT COMD NET FM
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SEC
GRC-3
PLAT
LDR
BRIDGE PLATOON

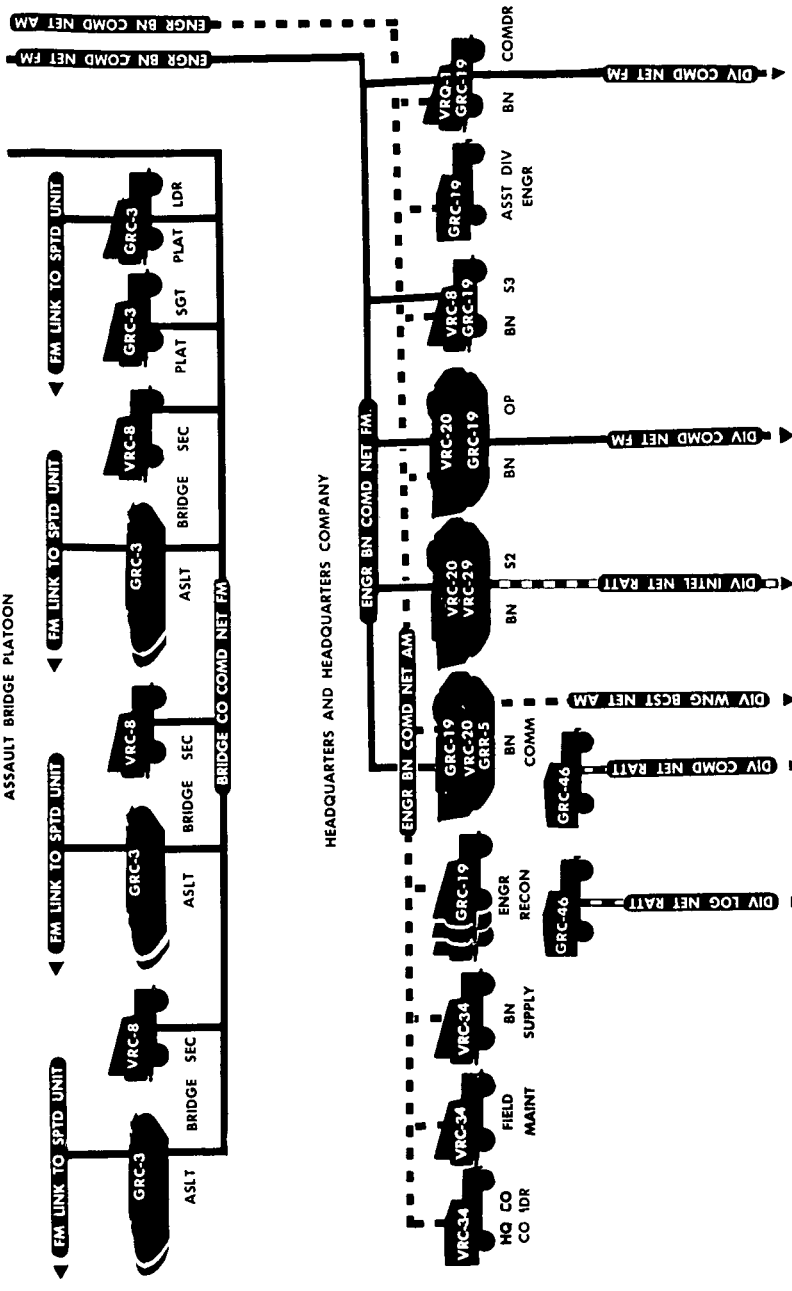


Figure 14. Type radio net diagram, armored division engineer battalion.

b. Operations. The battalion communication section performs duties described in paragraphs 13 through 15 and may supply equipment such as telephones to subordinate elements of the battalion as required. An armored personnel carrier is provided for operation of the battalion message center and as net control station for both of the battalion command nets. A RATT radio mounted in a ¾-ton truck provides a station in the *division command net RATT* while the assigned ¼-ton truck is used for wire operations, maintenance, and messenger center operations. When extensive wire systems are required, the battalion must be augmented by other engineer personnel for efficient installation operation, and maintenance.

Section II. COMPANY

94. General

All the armored engineer companies and the bridge company employ a communication system designed to facilitate highly mobile engineer operations while in support of armor forces. Organic equipment provides FM radios for internal command and control and contact with the supported organizations, and all supplemental means of communication.

95. Radio

(fig. 14)

a. Each company has an AM radio to maintain contact with the engineer battalion headquarters on the *battalion command net AM* to insure coordination and support of the engineer effort. The company commander in his ¼-ton truck or his command post vehicle maintains a radio tuned to the *battalion command net FM.* This net is normally used only when the company command post is within FM radio range of the battalion headquarters or when a member of the battalion headquarters visits the company area.

b. The company commander maintains contact with his subordinate elements on the *company command net FM* to facilitate support and coordination of the company mission, and he enters the supported organization command net FM to coordinate assigned missions. Both armor band and common band radios are available for this purpose, but the armored engineer company commander is normally in the *combat command command net FM.*

c. Each platoon leader of the armored engineer companies and the bridge company has the capability of entering two armor band nets and one common band net. These nets include the *company command net FM* and the *supported organization command net*

FM (usually a battalion task force net). Bridge platoons operate a common band *bridge platoon command net FM*, which may be used by the other armored engineer platoons when a bridge section is attached. Each bridge section throughout the companies has a common band radio capability that materially aids coordination between units.

d. The assault bridge platoon (composed of six armored vehicle launched bridges mounted on tank chassis) is provided a common band and an armor band radio. However, a platoon net is not required because these vehicles are not usually employed as a unit. Assault bridge vehicles would be expected to maintain contact in the *bridge company command net FM* and in the *supported organization command net FM*.

96. Supplemental Means of Communication

a. Engineer companies and platoons will enter the wire system of a supported organization, and full use is made of the division area communication system for contact with the battalion headquarters. To coordinate flow of materials and related problems during construction projects, engineer units employ wire circuits. Communication equipment for this purpose may be issued by the battalion communication section. Engineers should be trained in the installation, operation, and maintenance of wire because the battalion does not have sufficient organic personnel for these requirements.

b. Sound and messenger communication employed by these companies is the same as employed by elements of the division described above. Personnel who have other primary missions must be trained and used for these means.

c. Visual communication has a special importance to engineer units because of the large number of vehicles without radios.

d. Special application in the use of arm and hand signals may be required for employment of heavy equipment such as earthmoving vehicles. Principles of visual signals outlined in paragraph 12 of this manual apply to engineer units.

97. Communication Support

a. In the bridge company only one radio mechanic is assigned, but AM radio operators are authorized in the company headquarters and radiotelephone operators are authorized in the bridge and assault bridge platoons. These personnel should be trained and employed to accommodate the normal split of this company among other elements of the armored division engineer battalion.

b. Each armored engineer company has a communication chief and a radio mechanic. This is not enough to send support with

each platoon on a separate mission. However, centralized control of company maintenance is desirable, and these specialists should be capable of maintaining an efficient communication system.

c. Each company maintains its own electronic equipment, up to second-echelon maintenance, and, receives field maintenance support from the division signal battalion. When elements of the armored engineer or bridge company are in support of other armor organizations, the supported organization may provide limited second-echelon maintenance support.

Section III. SPECIAL SITUATIONS

98. Communication Employed With Nondivisional Engineers

a. General. When corps and army engineer units are in the armored division area of operation, division, corps, and army engineers must coordinate operations whether the higher headquarters units are in support or attached.

b. Radio. Higher headquarters engineer units employ AM radios for their primary means of radio communication. They employ also the vehicular-mounted infantry band FM radios in the same manner as their own radios. Thus, AM radio nets will remain the primary means for control and coordination among all engineer units in the division area when the necessary prior planning for frequencies, nets, and call signs has been made. FM radio may be used where shorter range coordination is required. Engineer troops and communication specialists must consider the fact that the common band radio employed by the armored division engineers does not provide a netting capability over the entire infantry band of frequencies that nondivisional engineers employ. However, with a minimum amount of advance planning, sufficient frequency overlap is available for use of the FM radio for its intended purpose of close coordination. In addition to these organic means of radio communication, the supported organization or the higher headquarters of either organization may draw, with minimum advance notice, from the signal depot, and issue to the nondivisional unit, portable armor and common band radios as required.

c. Supplemental Means. Both divisional and nondivisional engineers have a capability for entering wire systems, and the division area communication system is available to both. Where these engineer units are working on a common project, direct wire and messenger service should be established using personnel and equipment of both units. Sound and visual signals should be closely co-

ordinated by commanders. FM 21–60 is the basic visual signal guide for both units. SOP and SOI items must be coordinated and, if necessary, exchanged or modified.

99. Engineers Employed in an Infantry-Type Role

Under unusual circumstances, engineer units may be required to assume the role of provisional infantry. When such a circumstance arises, additional communication equipment, primarily FM portable radios, must be issued by the organization to which these provisional infantry troops are attached or, if operating under division, by the divisional signal battalion. For efficient use of engineers in this role, every attempt must be made to provide equipment on the same basis as the organic equipment issued to infantry units of the same size. Individual initiative of the personnel in the engineers units and the facilities of the headquarters to which they are assigned must be fully exploited to improvise additional channels of communication.

CHAPTER 9

COMMUNICATION IN ARMORED DIVISION SUPPORT ELEMENTS

Section I. DIVISION TRAINS AND DIVISION LOGISTICS CONTROL CENTER

100. General

Armored division trains contain the necessary logistical and administrative units necessary for operation of the division as a whole. Support units organic to the armored division, and those from higher headquarters not physically present with combat commands or division troops, are organized into the division trains. The trains are located in the division area for best support operations. A division logistics control center (DLCC) is established from elements of the division trains. It functions as a logistical control facility and provides a nucleus of an emergency headquarters for division logistical operations. FM 17–50 contains detailed information concerning organization and function of the division trains and DLCC.

101. Communication Facilities

a. Organic. The headquarters and headquarters detachment has only FM armor band radios. These radios are used by the trains commander, the officer in charge of the DLCC, the trains liaison officer, and the trains operation section.

b. Support. The trains area operations platoon of the command operations company of the division signal battalion furnishes signal support and facilities to all elements of the division trains. This includes a platoon leader who acts as the trains signal officer. The platoon operates a signal center in the division trains headquarters area. With equipment augmentation from the division signal battalion headquarters and headquarters company, the DLCC may be tied into the division area communication system by radio relay.

102. Trains Area Communication

(fig. 15)

a. Division Trains Command Net FM. This net is used by the division trains headquarters for internal control, coordination, and administration. Personnel in the trains headquarters, as noted above, and subordinate elements in the trains area enter the net as required. The net is used also for control of trains during dis-

placement and for coordination of local security. The net control station is operated from the operation section at the trains headquarters.

b. Trains Area Signal Center. The trains area signal center is installed in the trains command post area and furnishes all communication support required for operation other than the FM radio discussed in paragraph 101*a*. Normal signal center facilities, as discussed in paragraphs 123 through 126 are provided. The trains area operations platoon installs radio relay or field cable to the DLCC, and to division main signal center. These circuits are employed to link the division rear echelon and other subordinate elements of the division trains into the division area communication system at the trains area signal center. When the wire system involves extended distances, the two organic wire installation teams must be augmented by the signal battalion.

c. Automatic Data Processing System (ADPS) Supply Network. Links into the Army ADPS network are provided by field army signal facilities. Entry into the data transmission network is normally provided at division trains and is available for use by all division support elements.

103. Division Logistics Control Center Communication

a. General. The division logistics control center (DLCC) is located where it may best coordinate administrative and logistical support forward of the division trains headquarters and behind the combat command trains area. The DLCC contains representatives of support elements. The majority of administrative and logistical communication traffic in the division is funneled through this agency. FM radio equipment organic to elements furnishing personnel to the DLCC is provided for entry into the *division trains command net FM* and into their parent organization nets. The officer in charge of DLCC from the trains headquarters also has facilities for entry into the *military police company command net FM* for highway traffic control information. All other communication means are furnished by the division signal battalion. This signal support includes entry into the division area communication system, the *division command or staff nets FM*, and RATT equipment for operation in the *division logistical net RATT*. In any case, the DLCC must have the means for communication to division trains, division main command post, and major subordinate divisional elements.

b. Operation.

(1) Representatives of support elements at the DLCC maintain communication from the DLCC to parent organizations by organic FM and AM radio or through the divi-

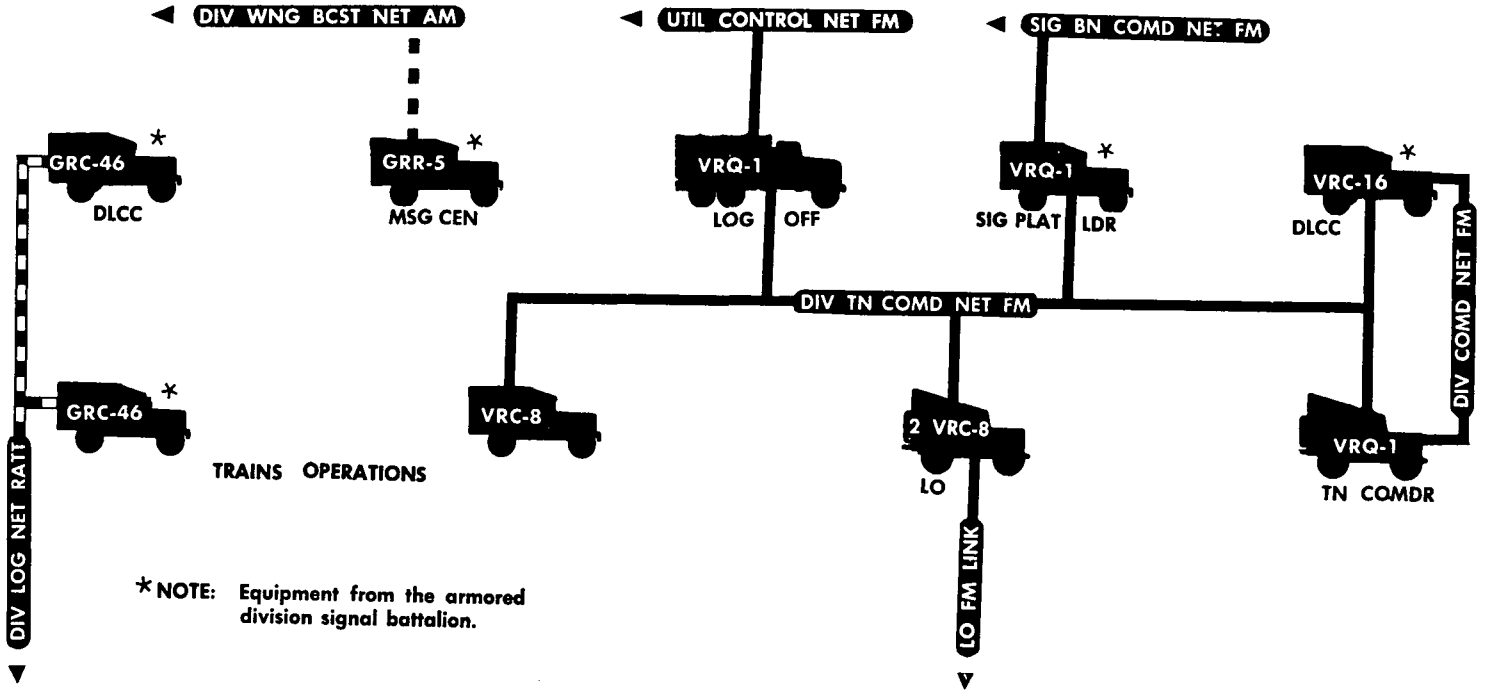


Figure 15. Type radio net diagram, armored division trains headquarters.

sion area communication system. Contact from the DLCC to the supported elements and the division special staff is through facilities provided by the division area communication. Normally representatives will include all technical services available to the division.

(2) The representative from the division ordnance battalion is the division ammunition officer (DAO). The DAO brings RATT equipment from his battalion for direct communication with higher headquarters ordnance support as required.

(3) The trains area operation platoon of the division signal battalion has organic equipment for installation of one complete signal center at trains headquarters. The DLCC is tied into the nearest signal center by cable if the distance is not great, but normally radio relay equipment from the signal battalion headquarters and headquarters company provides this link. Army furnishes equipment and personnel to connect the DLCC or the trains signal center into the area communication system of higher headquarters.

104. Division Logistical Net RATT

a. General. This net is used by all units in the armored division, from separate company and battalion or squadron to division level, for administrative and logistical purposes. Thus, the large number of stations participating in the system requires a high degree of traffic control and net discipline. If required, a system of multiple logistical RATT nets may be established to decrease the total number of stations in one net. This involves allocation of additional call signs and frequencies and a shifting at logistical agencies of available RATT equipment provided by the signal battalion. If multiple nets are employed, an SOP must be established for close coordination between the staff sections at division main, DLCC (or trains headquarters), and support units in the trains area. The decision as to which type of operation is to be employed must be made by the division commander and his staff.

b. Single Net Operation. When single net operation is in use, the net control station is furnished by the command operations company. It operates under control of the G4 at the division main command post. The signal battalion also furnishes equipment for this net at the DLCC and division trains headquarters. Other subordinate stations are organic to units entering the net and include combat commands, battalions (except the signal battalion), and the armored cavalry squadron. Artillery units and the aviation company may enter the net when required, but do not maintain stations in the net at all times (fig. 16).

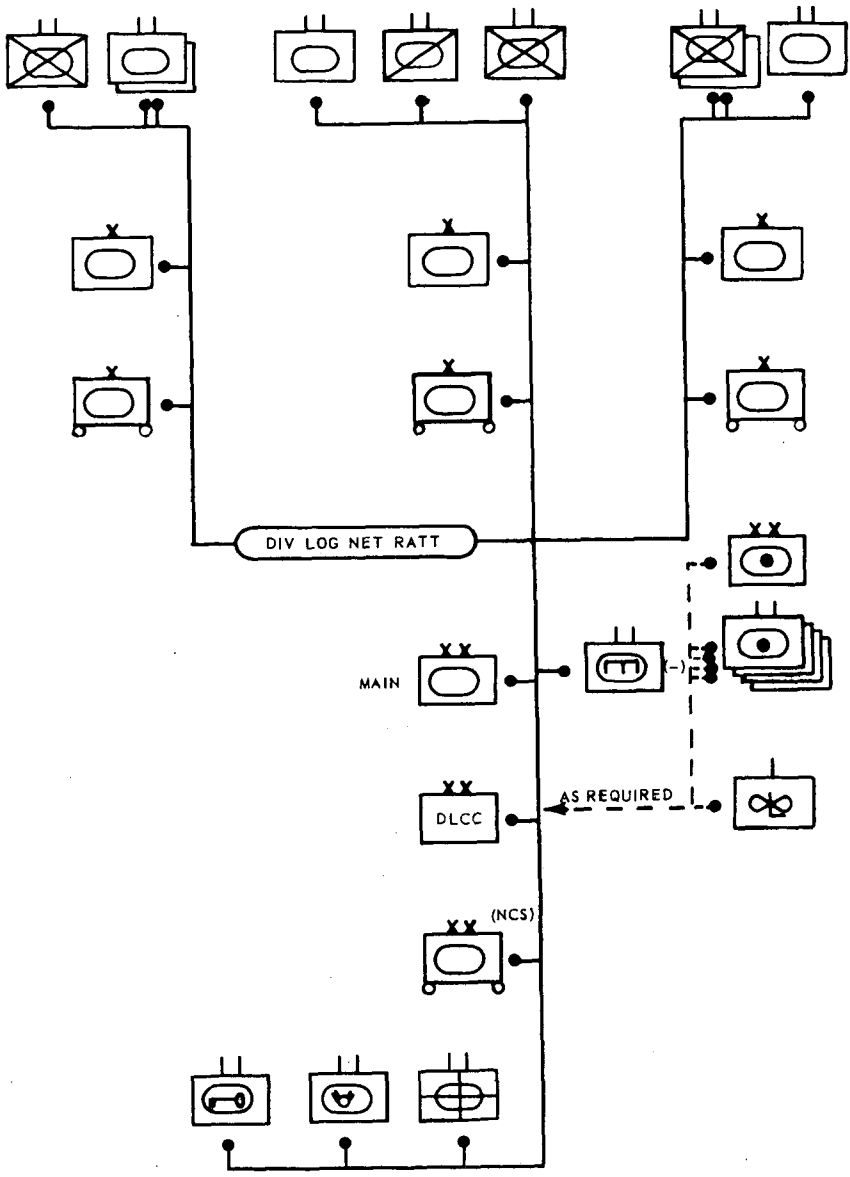


Figure 16. Single net operation, armored division logistical net RATT.

c. *Multiple Net Operation* (fig. 17).

(1) When multiple net operation is used, provisions must be made to coordinate messages from each of the individual nets at division main, DLCC, and division trains. These agencies require links through the division area communication system, and area signal center facilities must be available at each location.

(2) For multiple nets, the three combat commands (with attached and supporting elements) operate in separate RATT logistical nets. At DLCC or division trains headquarters, the signal battalion command operations company furnishes one RATT station for each of the division (individual combat command) logistical nets. Each of these stations from the command operations company acts as the net control station for the net in which it operates, and it is further tied into the division area signal center. Each battalion or separate unit station is assigned a call sign for each of the three nets in the division SOI, and will operate in the net of the combat command to which assigned. Thus, communication from units in the forward areas are transmitted by RATT to the station furnished by the signal battalion, and then tied into the area signal center for coordination with division main command post, DLCC, or division trains through the area communication system. Support units located in the trains area will receive logistical information transmitted through the multiple division logistical nets by the area communication system. This may be accomplished using the teletypewriter portion of organic radioteletypewriters on land lines that have been tied into the trains area signal center.

105. Area Damage Control

When procedures are instituted for area damage control (usually as a result of an enemy nuclear strike), unit FM radio, augmented by the division area communication system, provides the necessary links for operation. FM radio call signs and communication procedure must be planned and published for this emergency. Procedure for use of the division area communication system must be planned to prevent disruption of operations in the division system. See FM 17–50 for SOP.

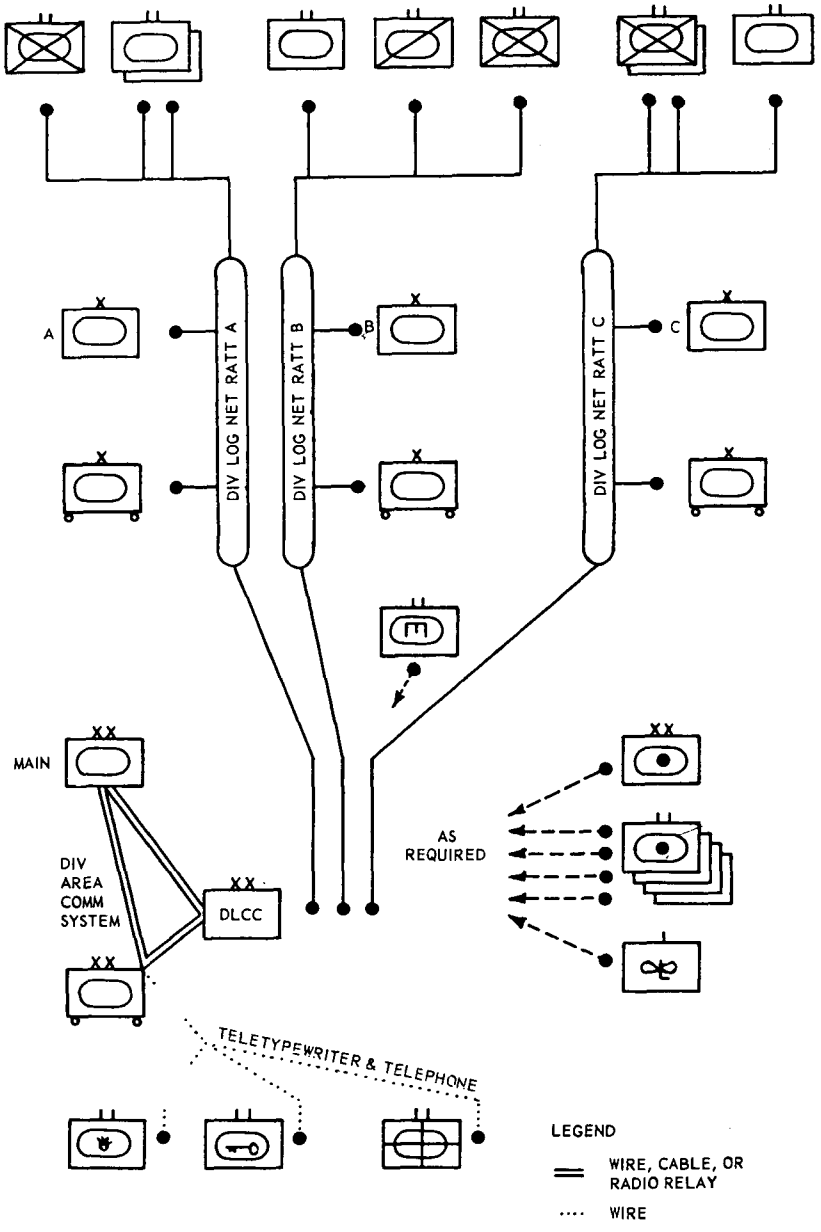


Figure 17. Multiple net operation, armored division logistical net RATT.

Section II. DIVISION REAR ECHELON

106. General

The division rear echelon is the part of the division normally located deep in the division rear. In this group will be found division headquarters rear echelon, with special staff officers not required at division main or alternate; the division administration company; and the division administrative center, composed of personnel sections from divisional units. The administration company commander usually acts as the division rear headquarters commandant, under control and coordination of the trains commander and AG. This echelon displaces only when necessary.

107. Communication at Division Rear

a. Communication for the division rear is provided by the rear echelon operations platoon of the command operations company, division signal battalion. Facilities include a message center, local wire lines, radioteletypewriter, and teletypewriter service. The rear echelon operations platoon leader acts as the signal officer for division rear.

b. One high power RATT station is operated from the division headquarters rear echelon signal center in a point-to-point circuit to the division main command post. When division rear is part of division trains the signal center operates also an FM radio in the *trains command net FM*. The signal center maintains a receiver in the *division warning broadcast net AM*. This center does not have an organic radio relay capability.

c. This signal center is tied into the division area communication system by field wire or cable to the nearest signal center. An organic wire installation team is in the rear echelon operations platoon for installation of local wire circuits. The land line link to the division area communication system is provided by an installation team from the division signal battalion, normally the trains area operation platoon. Entry into the army area communication system is furnished by army.

Section III. DIVISION QUARTERMASTER BATTALION

108. General

The armored division quartermaster battalion consists of a headquarters and headquarters detachment, a supply company, and a field service company. These units provide the division with truck transportation and general quartermaster services. The normal concept of operations is the locating of distribution points at each combat command and the retaining of other elements of the battalion at the DLCC or trains.

109. Organic Communication

(fig. 18)

a. FM radio provides the primary means for command and control of subordinate elements of the quartermaster battalion. Authorized FM radios at platoon, company, and battalion operate in the quartermaster *battalion command net FM.*

b. The quartermaster battalion commander may operate in the division command net or staff net FM or in the trains command net FM, in addition to the battalion command net FM. The battalion executive officer and the operations section (which operates the net control station) normally operate in the trains command net and the battalion command net FM.

c. AM equipment is organic to the headquarters detachment to operate a receiver in the *division warning broadcast net AM.* Radioteletype equipment is employed in the *division logistical net RATT* when this net is operated as a single logistical net. When multiple nets are functioning, the teletype portion of the radioteletype equipment is tied into the trains area signal center by wire for transmission of logistical matters.

d. The headquarters detachment has a capability for installation and operation of a simple wire system for internal communication among battalion elements located in the trains area. The battalion communication chief directs and supervises operations of the communication personnel and coordinates activities with the trains signal officer. Other personnel include one radioteletype team, message center operators, and wireman.

e. The division area communication system is used by the battalion for contact with subordinate elements dispersed throughout the division area of operation.

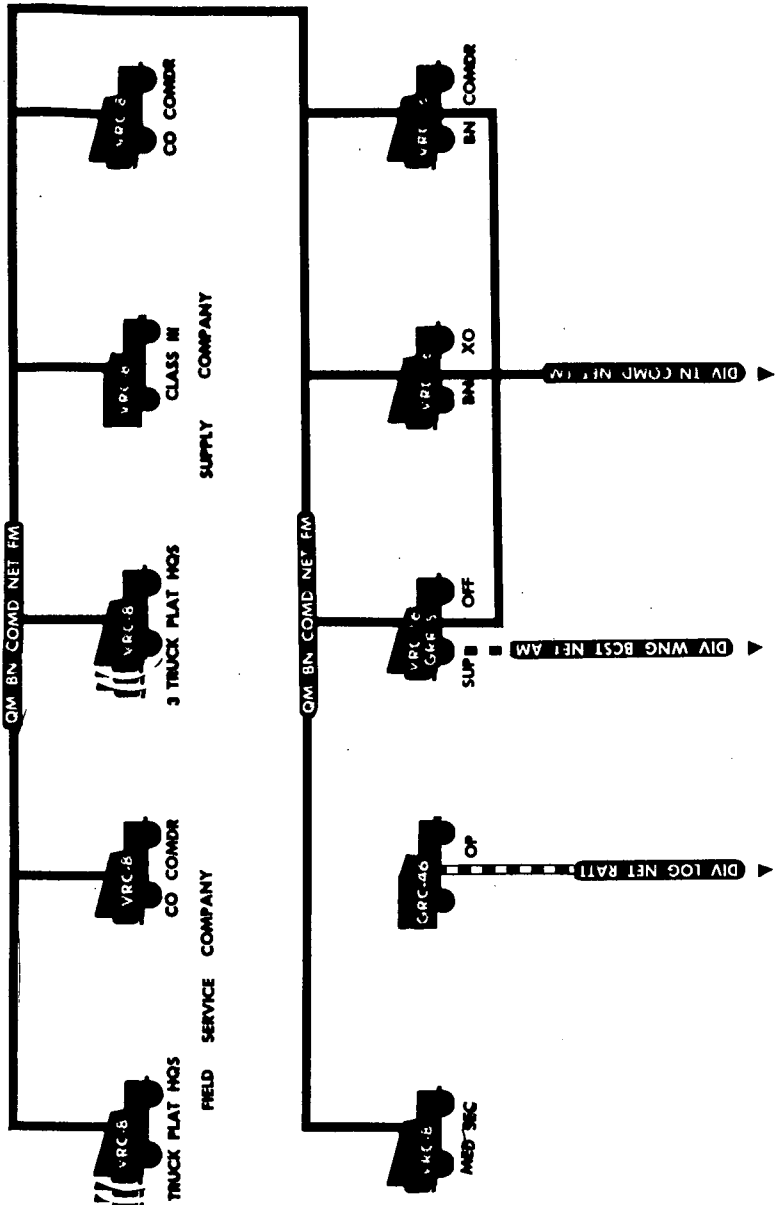


Figure 18. Type radio net diagram, armored division quartermaster battalion.

Section IV. DIVISION ORDNANCE BATTALION

110. General

The armored division ordnance battalion consists of a headquarters and main support company and three forward support companies. The headquarters and main support company furnishes command, control, and administration to the ordnance battalion, the division ordnance staff section, and the DAO section, and ordnance support to elements of the division. Forward support companies furnish ordnance support to combat commands and division elements in the forward area.

111. Radio Communication

(fig. 19)

a. The ordnance *battalion command net FM* is used by the ordnance battalion commander for contact with subordinate companies, and by the headquarters and main support company for internal communication. The battalion commander and the ordnance materiel officer (who maintains the net control station) are the only members of the battalion headquarters in this net. These officers operate also in the *division trains command net FM* when required.

b. The ordnance *battalion command net AM* is used by the ordnance materiel officer for communication over extended distances to the forward support companies from battalion headquarters.

c. The *division warning broadcast net AM* is monitored by a receiver located in the battalion operations vehicle.

d. The *division logistical net RATT* is entered by the ordnance battalion operations section from division trains for coordination of ordnance logistical matters when this net is operating as a single net. When multiple logistical nets are in use, the teletype portion of this radioteletype equipment is employed on a land line to the trains signal center. A second RATT station is provided to the DAO at the DLCC for direct communication to supporting army agencies regardless of the type of division logistical net in use.

e. A forward support *company command net FM* is employed by each forward support company with the combat commands. A net control station is operated from the company shop van in this net, which provides communication between elements of the company.

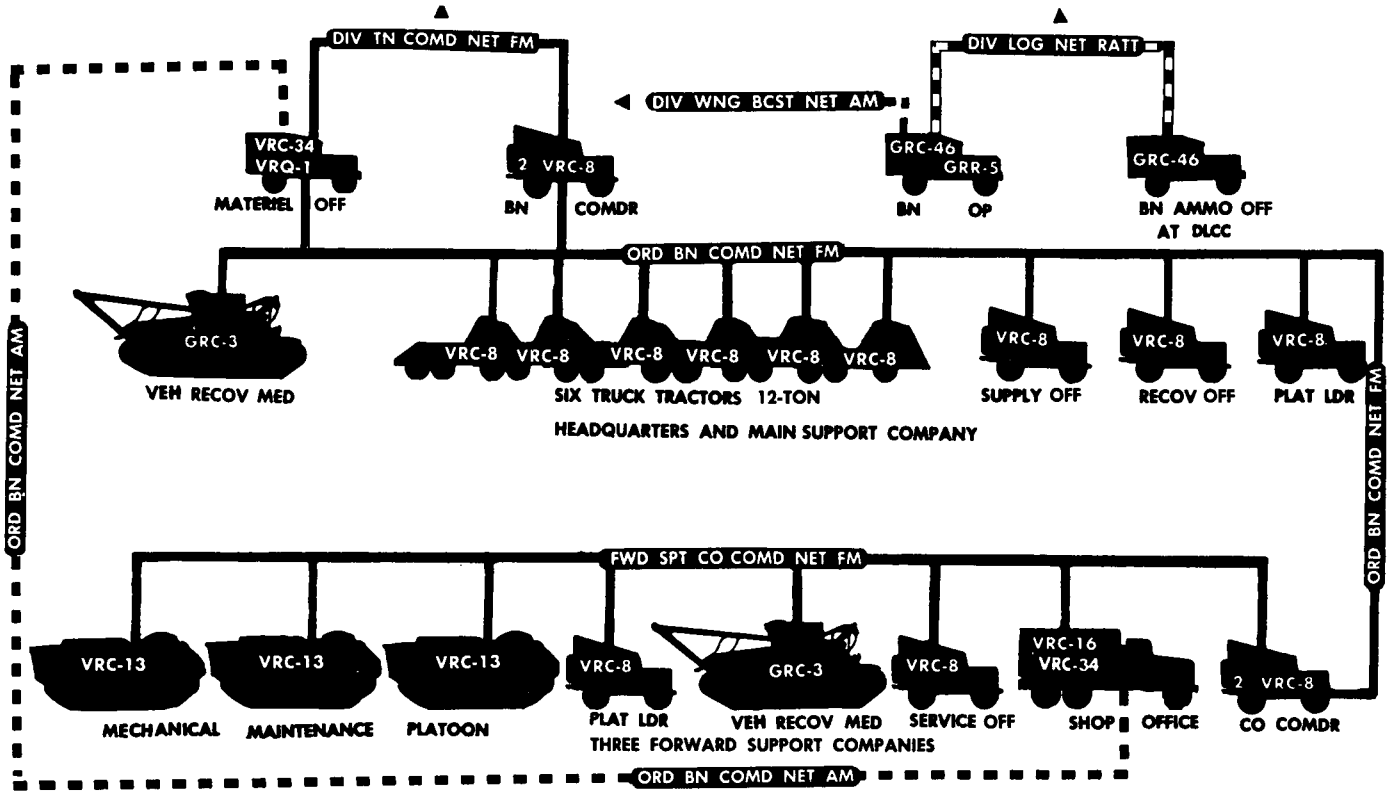


Figure 19. Type radio net diagram, armored division ordnance battalion.

112. Supplemental Means of Communication

a. Each company in the battalion has an organic capability for installation and operation of an internal wire system. This wire system is tied into the area communication system at the nearest signal center. Each company has a land line teletypewriter in the area communication system. Unit clerks operate these machines. Also other means standard throughout armor units are used.

b. Direct communication with corps or army ordnance support is provided through the division area communication system and through facilities furnished by higher headquarters.

113. Communication Specialists

a. Headquarters and main support company has radioteletype teams, intermediate speed radio operators, radio mechanics, and personnel for wire operations. The senior noncommissioned officer from the radioteletype teams is the communication chief. He coordinates operations of these specialists and maintains close liaison with the trains signal officer. Second-echelon maintenance for elements of the ordnance battalion is furnished by the headquarters radio mechanics.

b. Forward support companies have intermediate speed radio operators and specialists for wire operations. These specialists are assigned to the company headquarters, and the senior specialist is normally designated as the communication chief.

Section V. DIVISION MEDICAL BATTALION

114. General

The armored division medical battalion consists of a headquarters and headquarters detachment, a clearing company, and an ambulance company. The companies consist of four platoons. The battalion furnishes medical support throughout the division area to include direct support to the three combat commands. The battalion normally maintains an office for the division surgeon at division main and a representative at the DLCC.

115. Radio Communication

(fig. 20)

a. The medical *battalion command net AM* provides the primary radio communication link between the battalion commander, battalion operations, company commanders, and clearing stations.

b. The medical *battalion command net FM* is used for internal coordination of medical matters at clearing stations and, when distances permit, with battalion operations.

c. The *division warning broadcast net AM* is monitored by the battalion operations and the medical supply section.

d. The *division trains command net FM* is entered by the battalion operations section when elements of the medical battalion are in the trains area.

e. The *division logistical net RATT* is used for receipt and transmission of medical matters by the battalion medical supply officer when this net is in operation as a single net. When multiple nets are in use, the medical supply section radioteletypewriter must be located in the trains area and the teletypewriter portion of the equipment is tied into the signal center by wire.

116. Supplemental Means of Communication

The headquarters and headquarters detachment, located in the trains area, may install and operate an internal wire system. Each of the four clearing stations in other areas of the division must be tied into the nearest signal center. Contact with higher headquarters medical support is provided through the division area communication system and through facilities furnished by higher headquarters.

117. Communication Specialists

a. Headquarters and headquarters detachment contains a communication chief, radioteletype and intermediate speed radio operators, radio mechanics, and wire personnel. The communication chief coordinates communication activities with the trains signal officer, and supervises battalion communication operations. Second-echelon signal maintenance for the battalion is performed by these specialists.

b. Ambulance and clearing companies have intermediate speed radio operators as the only communication specialists.

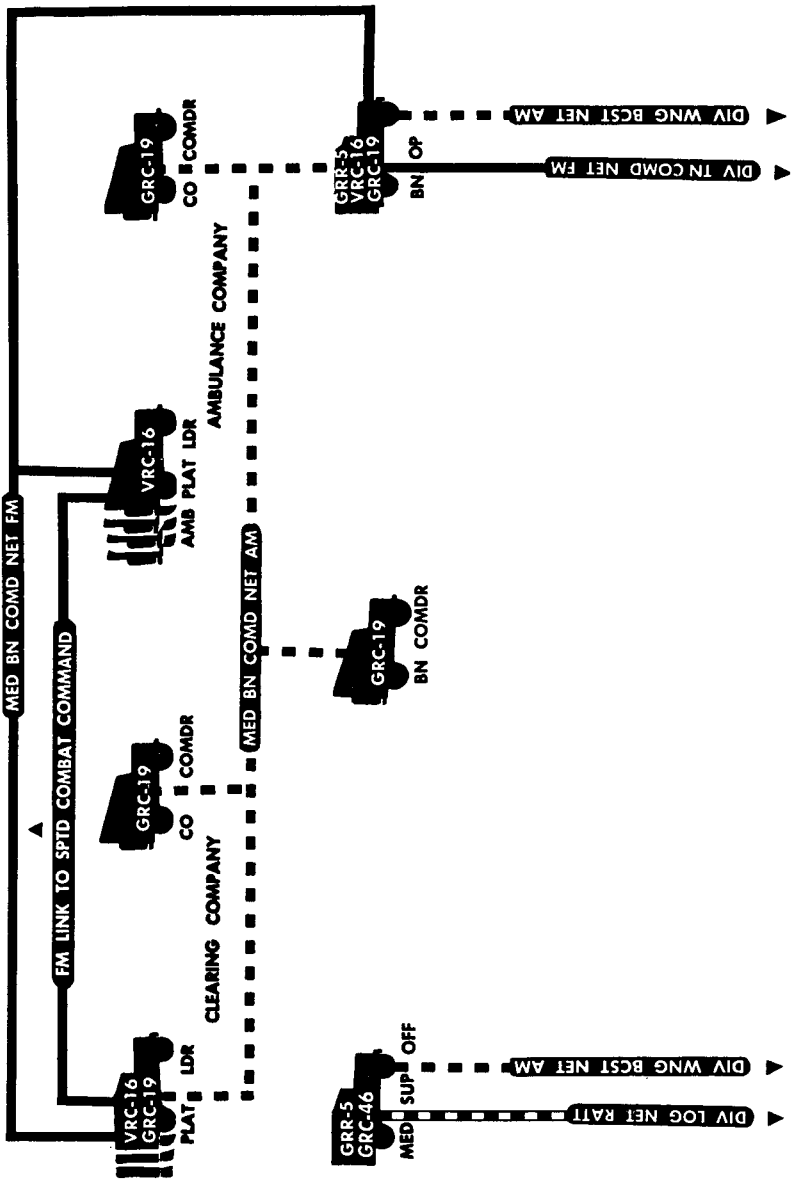


Figure 20. Type radio net diagram, armored division medical battalion.

CHAPTER 10

COMMUNICATION IN THE ARMORED DIVISION SIGNAL BATTALION

Section I. GENERAL

118. General

This chapter presents a brief outline of the organization, mission, and capability of the armored division signal battalion and the armored division area communication system. Information on the organization, administration, and employment of this unit is contained in FM 11–11.

119. Organization

The armored division signal battalion consists of a headquarters and headquarters company, a command operations company, and a forward communication company. In headquarters company is the armored division signal officer's section, which usually operates at the division main command post and maintains close coordination with the signal battalion command post.

120. Mission

The mission of the armored division signal battalion is to provide signal communication to armored division headquarters and subordinate elements. This includes establishment of a division area communication system, area ground messenger service, limited cable/wire construction, photographic service, signal supply, and field maintenance of signal equipment. This mission is accomplished by operation of area signal centers throughout the division area.

121. Control

a. Administrative and operational control of the signal battalion is the responsibility of the battalion commander, who is also the division signal officer. Other officers of the battalion headquarters and staff sections serve in similarly dual roles.

b. Command and control of the signal battalion is facilitated through an internal *battalion command net FM.* The battalion commander, appropriate staff officers, and subordinate commanders use this net.

122. Division Signal Officer Section

a. General. The division signal officers' section consists of the signal officer, the assistant signal officer, the radio officer, the wire

officer, and the enlisted personnel necessary to carry out the division signal planning. This section is located at the division main command post, but the division signal officer will normally be at the same operational echelon as the division commander (par. 6).

b. Duties.

(1) The division signal officer:

(*a*) Directs technical training of the signal battalion.

(*b*) Is the division special staff officer for signal matters.

(*c*) Commands the division signal battalion and exercises operational control over signal units attached to the division.

(*d*) Exercises control over signal maintenance in the division.

(*e*) Exercises control over requisition, stockage, and issue of signal supplies in the division.

(*f*) Is responsible for preparation of paragraph 5, the signal annex, and the electronic warfare appendix of the division operation order.

(2) The battalion executive officer performs as many of the battalion command functions as regulations will allow and as the battalion commander/DSO may delegate. Normally, the battalion executive will be the next junior to the battalion commander/DSO.

(3) The assistant division signal officer performs duties assigned by the DSO and supervises the DSO section and may act as the DSO in that officer's absence.

c. Operations. The division signal officer's section is responsible for the following:

(1) Preparation of the division signal operation instructions (SOI) and standing signal instructions (SSI).

(2) Preparation of signal records and reports.

(3) Preparation of the signal annex of the division SOP.

(4) Preparation of the signal annex of the division administrative order.

(5) Presentation of briefings on signal matters when required.

(6) Coordination of operations of attached signal and electronic warfare units.

(7) Coordination of school quotas for nondivisional schools with the G3.

(8) Coordination of the assignment of communication specialists.

(9) Establishment and operation of division communication specialist schools.

(10) Recommendations for signal equipment and personnel changes on TOE's of the division.

(11) Furnish and coordinate technical personnel to conduct signal inspections within the division.

(12) Request and coordinate road priority for signal vehicles.

(13) Request, coordinate, and control signal technical representatives.

Section II. DIVISION AREA COMMUNICATION SYSTEM

123. General

(fig. 21)

The concept of operations in an armored division, with its inherent flexibility, mobility, and capability of dispersion, creates a greater demand than heretofore on the communication system. The division area communication system facilitates control of the division through multiple and alternate routings of radio relay. A series of mobile signal centers are used to tie together the system by 12 channel radio relay links. General provisions of the signal centers are discussed in paragraph 124. The configurations for location of division signal centers are based on the tactical disposition of major division tactical elements. The actual engineering and construction of the most appropriate configuration is the responsibility of the division signal officer. Since the division is usually mobile, it follows that this configuration is never static. It is continuously changed to support not only the current disposition of units, but also the projected future needs. Success under such a condition depends upon complete integration of signal planning with overall operational planning. It is essential that there is a signal center located at the alternate division command post. The alternate signal center serves in part as an advance signal center for the division main command post. Signal equipment not in use at the main signal center may be kept on standby at the alternate center. By coordination with the G3, location of the signal centers are selected to serve as nucleus for the next division main command post. In the regular process of occupation of a succession of command posts, the alternate signal center provides a smooth transition from a small facility to a major hub or terminal of the principal communication links to the leading units. When the division main command post displaces to this site, the process is repeated, and a new alternate (or advance) signal center is established.

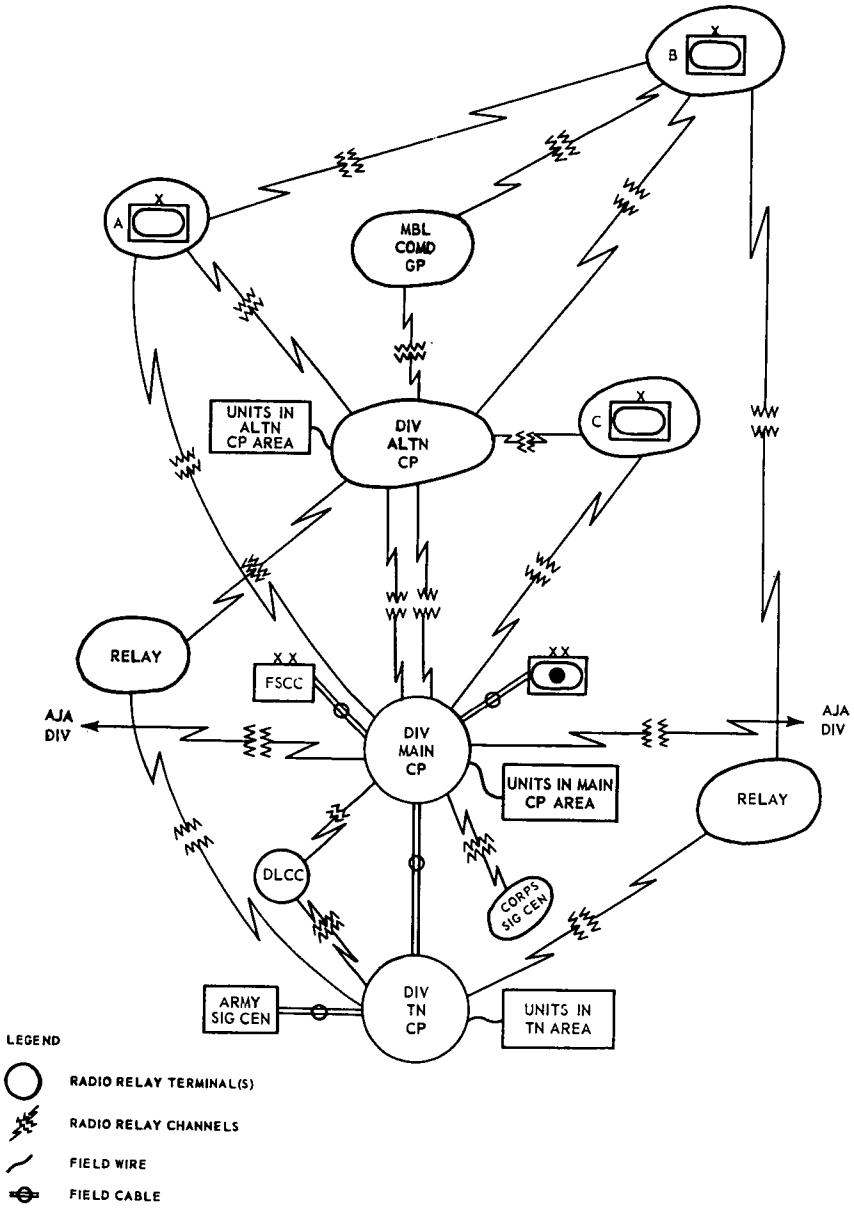


Figure 21. Type configuration, armored division area communication system.

124. Area Signal Centers

(fig. 22)

a. General.

(1) Signal facilities are provided to the armored division by the signal battalion through signal centers strategically located throughout the division area of operations. These signal centers are organized for operation in two general areas: one, the forward area signal centers organized from the forward communication company, and two, the command and trains area signal centers organized from the command operations company. The signal battalion headquarters and headquarters company provides additional facilities required to support these area signal centers.

(2) Facilities common to both kinds of signal centers will be discussed in this paragraph, while facilities peculiar to specific signal centers are discussed in succeeding paragraphs.

b. Signal Communication Facilities.

(1) Patching panels which terminate field wire, cable, and radio relay circuits permit monitoring of switchboards and teletypewriters and control of circuits.

(2) Telephone switchboards for handling local and trunk circuits are provided in each signal center to facilitate all units in the area.

(3) Multichannel radio relay trunk facilities are provided between signal centers (except at division rear) by at least two or more routes primarily for long distance communication in the division area.

(4) Field wire and/or cable installation teams are available for connecting division units to the signal center.

(5) An FM voice radio-wire integration station is operated at each signal center except the rear echelon center to connect mobile FM radio users into the area communication system. Procedure for use of this service is found in the division SSI, and frequencies are assigned in the SOI.

(6) Communication centers are operated in the division area communication system as components of each signal center. Cryptographic, teletypewriter, message center, and messenger service are associated with each of these communication centers.

125. Trunk Circuits

Trunk circuits employing radio and wire in the division area communication system provide a means of communication from the echelons of the division headquarters to immediate subordinate units, and among these elements. They also provide long lines and channels, on a common-user or sole-user basis, for the use of other divisional elements in lieu of or to supplement the organic communication of these elements. The division signal battalion has a limited field wire construction capability. Its principal employment is to install short lines from radio relay stations to switchboard and to units in the immediate vicinity of area signal or switching centers. The primary trunk service between signal centers is provided by radio relay. When circumstances require an extensive land line trunk system, the signal battalion is reinforced by army signal troops.

126. Common- and Sole-User Circuits

The division area communication system is comprised mainly of common-user circuits, which are used by all subscribers in the system. To meet special requirements, a limited number of sole-user circuits may be allocated. Sole-user circuits are circuits allocated to a specific organization or section on a full-time basis to provide point-to-point communication by eliminating switchboard procedure. Allocation of these circuits is based either on traffic volume or on traffic urgency. In the first instance, traffic must be great enough to keep the sole-user circuit busy during most of the 24-hour day. In the second instance, the tactical urgency of certain traffic must warrant sole-user service.

Section III. SIGNAL COMPANIES

127. Headquarters and Headquarters Company

a. Mission. The mission of the headquarters and headquarters company, armored division signal battalion, is to provide command, control, coordination, and logistical and administrative support to the signal battalion. This includes backup signal supply, maintenance, and equipment support to the battalion. This company provides also photography service, signal supply, and signal field maintenance to the division.

b. Capabilities. The headquarters and headquarters company:

(1) Plans, controls, and coordinates the training and operation of the armored division signal battalion.

(2) Provides administrative, logistical, and supplemental maintenance support for the signal battalion.

(3) Performs field cable installation and recovery for subordinate elements of the signal battalion. Each of the four 8-man teams used for this function is capable of installing an average of 5 to 8 miles of cable in each 12-hour day on the ground or on existing supports.
(4) Provides up to five radio relay terminal, repeater stations, or telephone carrier terminal station teams. These teams are to augment signal battalion operating companies. Equipment is available for more extensive terminal/repeater facilities, but personnel must be provided from other units.
(5) Performs field maintenance on signal equipment (including aviation electronic equipment) for the division. This service is provided through operation of mobile repair teams, and may be accomplished by on-the-spot repair, direct exchange, or repair and return to user.
(6) Provides still and motion picture coverage (except aerial photography) and two photographic laboratories (one at the division airstrip) for the division.
(7) Provides signal supply for the division.
(8) Provides personnel for operation of the division signal officer section at the division main command post.

128. Command Operations Company

a. Mission. The mission of the command operations company of the armored division signal battalion is to provide signal communications for all echelons of division headquarters. This includes operation of a part of the division area communication system, furnishing facilities to connect division artillery into the system, operation of net control stations and other stations in division nets and nets of higher headquarters, and operation of the area ground messenger service.

b. Capabilities.
(1) The company headquarters provides command, control, and coordination of the company operations.
(2) Command elements of the company establish and operate four signal centers. These centers are established to serve the division main command post, the alternate (or advance) echelon, division trains, and a limited signal center at the division rear echelon.
(3) Facilities are further provided for connecting division artillery headquarters and fire direction center, the fire support coordination center, and the division logistics control center into the division area communication system.

(4) Personnel and vehicles are provided to operate the division area ground messenger service.
(5) Personnel and equipment are provided to operate the net control stations for major division radio nets. Additional facilities are provided for operation of other subordinate stations in these nets.
(6) Radio facilities are provided to link division command elements into the communication system of higher headquarters.
(7) Field wire or cable may be installed between organic signal centers.
(8) One point-to-point radioteletype circuit is provided for communication between the division main command post and the division rear echelon.

129. Forward Communication Company

a. Mission. The mission of the forward communication company of the armored division signal battalion is to provide signal communication to combat commands and division elements in the forward areas. This includes operation of signal centers in the forward areas, connecting units into these centers, furnishing limited signal field maintenance to division units in forward areas, and operating a portion of the division area communication system.

b. Capabilities.

(1) The company headquarters provides command, control, and coordination of company operations, including mess and automotive maintenance. Services may be sent down to supplement the services furnished by the supported combat command, and the remainder of the company headquarters may be kept in a central area where it can best control operations.
(2) The company installs and operates three forward area signal centers to provide communication to division elements in the combat command area of operation. These centers are supplemental to the organic capability of the supported units (pars. 130–132).

Section IV. COMBAT COMMAND AREA SUPPORT PLATOON

130. General

(fig. 22)

One combat command area support platoon operates with each combat command. Each platoon provides signal support for the

combat command to which assigned and to other units in the division forward area. Once placed in direct support, the area support platoons remain and move with the combat commands. All communication equipment is mounted in vehicles. Each platoon operates a forward signal center that provides entry into the division area communication system for the combat command and other units in the area. Close coordination among the combat command area support platoon leader, the combat command communication platoon leader, and the combat command communication officer is essential to insure the best location of the area support platoon and to provide the communication requirements necessary to support the combat command. Coordination of message centers and wire operations will assist in efficient operation of both platoons and in elimination of duplicated effort.

131. Organization and Mission

a. Each combat command area support platoon is organized into platoon headquarters and a message center, telephone, radio, installation, and forward repair sections.

b. The platoon provides facilities that supplement the organic communication capabilities of the combat command and attached and supporting units. The forward signal center provides direct signal support for the combat command, and general signal support, including limited wire laying and signal field maintenance, for other units in the area.

132. Operation

a. The combat command area support platoon with each combat command establishes a signal center to provide area telephone and teletypewriter switching service to units in the division forward area. The platoon installs and maintains field wire trunks between the combat command command post and trains area. Artillery battalions in support of the combat command connect themselves into the division area communication system at the signal center, using organic communication equipment. The combat command area support platoon has the further requirement of installing and maintaining field wire trunks between the combat command command post and subordinate battalions. The platoon can provide one 8- or two 4-man field wire teams for this purpose.

b. The forward signal center established in support of a combat command provides alternate routes over multiple axes to adjacent combat commands, to echelons of the division headquarters, to division trains, and to other signal centers. FM radio-wire integration permits calls from FM radios into the division area communication system for telephone service. Each combat command

area support platoon, by providing field wire lines from the combat command post to the trains area and to subordinate units, provides the combat command headquarters with wire communication to its combat, service, and support elements.

c. To each combat command area support platoon, vehicular-mounted radio relay terminals are attached from the forward signal company radio terminal and carrier section. Each of these radio relay terminals provides ultrahigh frequency (UHF) equipment terminating two 12-channel telephone or teletype circuits. Each of the separate 12-channel circuits comes from a separate distant terminal. Using 2 terminals, the forward signal center normally furnishes circuits to signal centers at division main, division alternate, and to adjacent signal centers (or switching points) (fig. 22). Many configurations are possible in the division area communication system. Close coordination must be made with the combat command S3 as to the tactical situation and future operations. This necessity for coordination and location of command post cannot be overemphasized since radio relay equipment operates on a line-of-sight principle.

d. The forward repair section of the combat command area support platoon performs second- and limited third-echelon maintenance of signal equipment for the area support platoon, and limited third-echelon maintenance for other forward elements of the division. Each section is authorized a mobile shop van equipped to provide general maintenance support, and will perform it normally by direct exchange. As far as possible, maintenance is performed *on call* in the supported units area. Physical repair of defective components is performed only in emergencies, and defective components are normally returned to the rear area for repair and return to stock.

e. For security reasons it is preferable that each forward signal center be located within the combat command command post. This arrangement permits closer coordination in the operation of the combat command communication platoon and the area support platoon and, in many instances, joint operation of communication facilities.

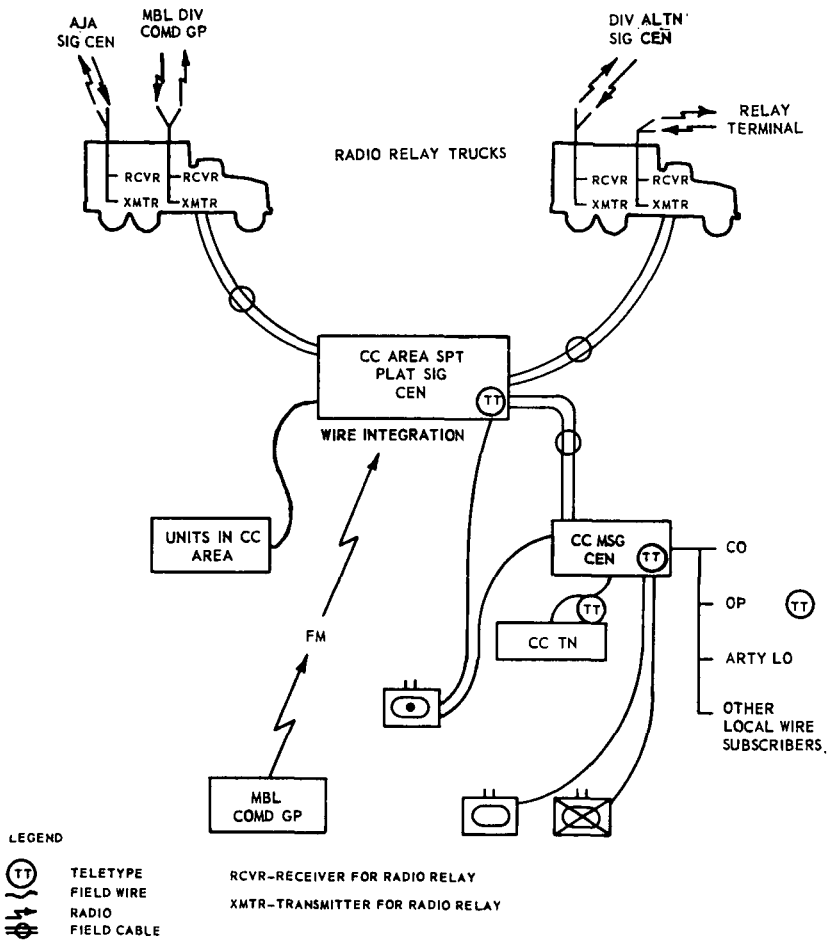


Figure 22. Type configuration, combat command area signal center.

CHAPTER 11

COMMUNICATION IN SEPARATE ARMORED DIVISION COMPANIES

Section I. AVIATION COMPANY

133. General

a. The armored division aviation company is organized and equipped to support the armored division with fixed and rotary wing aircraft. The mission of the aviation company is to increase the combat effectiveness of the armored division by providing immediately responsive aviation support.

b. This section outlines a communication system for the armored division aviation company. Details of aviation company operations are found in FM 1–5 and FM 1–100.

134. Radio Communication

(fig. 23)

a. General.

(1) The communication system required by the aviation company must be extremely flexible and provide communication capabilities not normally required by other company-level units. It has the requirement for long range voice communication between ground elements and from ground-to-air and air-to-air stations. In addition, communication is required with other divisional units for coordination of aviation activities. The aviation company is equipped with AM, RATT, UHF, and FM radio equipment to fulfill these requirements. Aircraft-mounted radios employ line-of-sight equipment, which extends the transmitting and receiving range of radio to great distances. This presents a problem of transmission security in that the enemy may intercept transmissions made by airborne radio more readily than by ground radios.

(2) The basic FM radio employed by aircraft of the aviation company has a frequency capability enabling communication in armor, artillery, infantry, and common frequency bands, while ground radios in the aviation company are armor or artillery band (or a combination armor and artillery band) radios. The aircraft FM radio has a capability of homing in on ground sets, which is a valuable aid in locating landing areas, message drop or pickup points, and isolated units. Aircraft UHF radio equipment

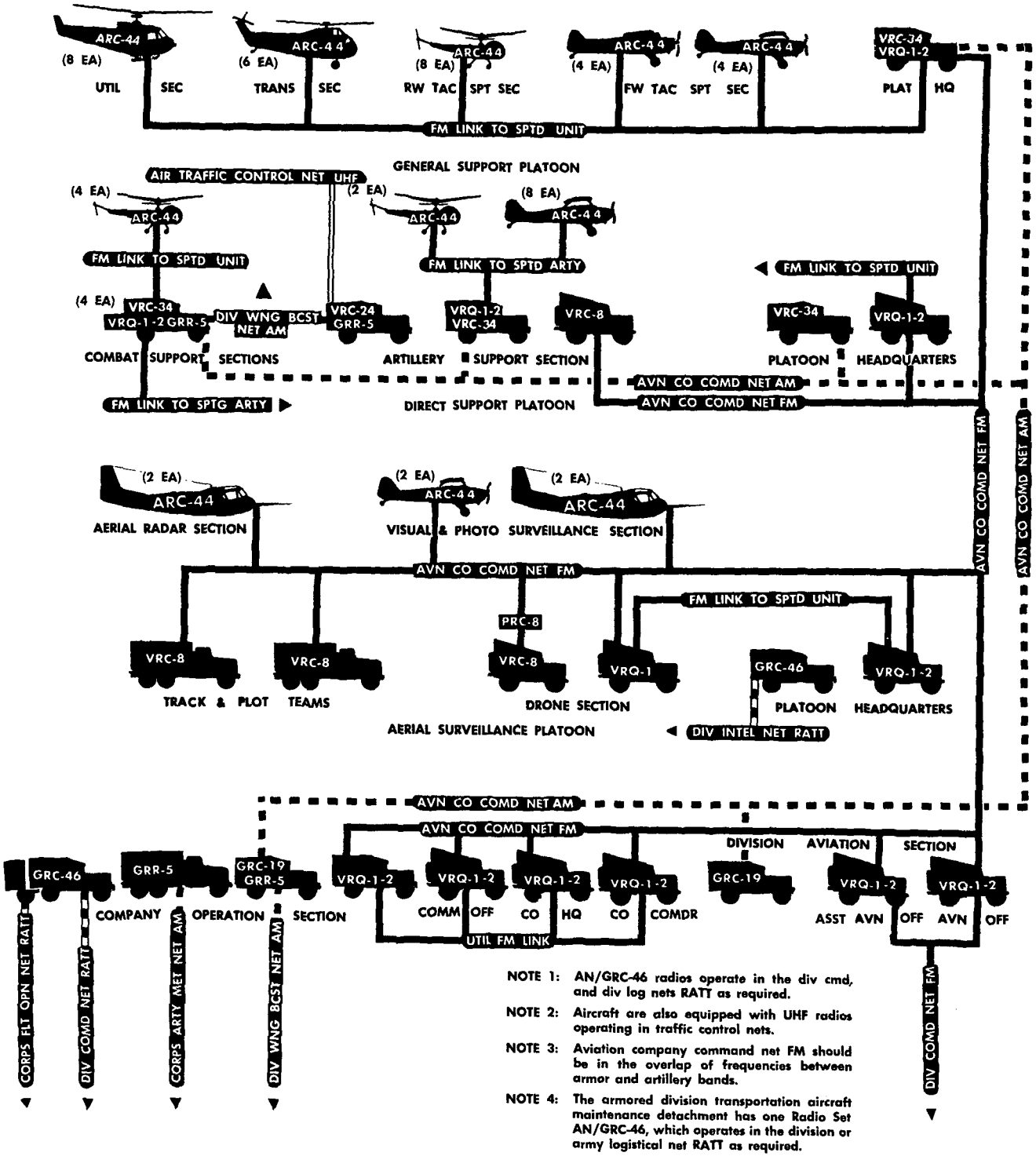


Figure 23. Type radio net diagram, armored division aviation company.

is available for air-to-air communication, air traffic control, and emergency rescue. Vehicular-mounted radios include AM and RATT radios plus UHF equipment for air traffic control and communication with aircraft from other services.

b. Nets to Higher Headquarters. The aviation company headquarters operates radios in nets of the division, and elements of the company operate radios in nets of the supported units. The company operates radios also in certain corps radio nets for air coordination and control. The nets to higher headquarters are:

(1) *Division command net RATT.* The company communication section operates a station in this net, linking the aviation company command post with the division command post.

(2) *Division intelligence net RATT.* The aerial surveillance platoon operates in this net to provide a direct exchange of information with the division intelligence section.

(3) *Division command net FM.* The company commander and company headquarters section operate radios in this net, which provides the division commander a direct channel of communication to his tactical commanders.

(4) *Division warning broadcast net AM.* The aviation company operations section monitors this net to receive warnings of enemy air and CBR attacks and other information of an urgent operational nature.

(5) *Corps flight operations net RATT.* The aviation company operations section operates a radioteletype station in this net and coordinates company air activity with the corps flight operations center.

(6) *Corps artillery meteorological net AM.* The aviation company monitors this net and receives weather reports and other information.

c. Nets to Supported Units. Sections of the aviation company placed in support of artillery and other units of the division will enter the FM radio net of the units they are supporting and maintain AM communication with the aviation company headquarters. UHF can also be used as a secondary air-to-ground link to units having this capability.

d. Aviation Company Radio Nets.

(1) *The aviation company command nets FM and AM* provide the primary means for control and coordination of Army aircraft throughout the division area. The FM net is used for contact among aircraft in the air, ground command stations, and the company flight operations center. The FM command net frequency is assigned in

the overlap of frequencies between the armor and artillery bands so that all organic FM radios in the aviation company may enter the command net. The AM net is used as required for command and logistical matters between ground elements of the company.

(2) *Air traffic control net UHF* is employed for traffic control from the aviation company base airstrip and the artillery support section to airborne aircraft.

135. Supplemental Means of Communication

a. Wire. The company is equipped with switchboards and a sufficient number of field telephones to operate a company wire net linking the company headquarters with other elements of the company. The aviation company is tied into the nearest division area signal center that provides telephone communication to all major units of the division and to elements of the aviation company in support of division units.

b. Visual. Signaling by visual means is important to the aviation company communication system. Visual signals are used for air-to-air, ground-to-air, and ground guide to aircraft communication. These signals include aircraft control, marking of airstrips, approaches to runways, and directional lights at night. Aircraft may convey information to ground troops by aircraft maneuvers.

c. Other Means. Messenger communication in the aviation company is employed as outlined in previous sections for other armor units. Sound signals are employed for intercommand post communication purposes.

136. Communication Support

a. General. Support from the division signal battalion for the aviation company is similar to that furnished armor organizations throughout the armored division.

b. Communication/Air Traffic Control Officer. The communication officer of the armored division aviation company has the duty of air traffic control officer for the company in addition to his regular duties. As such he supervises air traffic control communication and installation of navigational aids within local areas.

c. Communication Section. The support provided by the communication section is generally the same as noted in paragraph 13 for communication platoons. Operators and maintenance personnel for the electronic equipment in the aviation company are organic to the section normally employing the equipment.

137. Combat Support Sections

One of the four combat support sections of the direct support platoon is normally attached to each combat command and to the armored cavalry squadron. Each section has organic radio equipment to communicate with the aviation company headquarters (or base airstrip) in the *aviation company command nets AM and FM*, and to monitor the *division warning broadcast net AM*. Vehicular FM equipment is available for the sections to enter the combat command and armored cavalry squadron radio nets. From aircraft, the section may enter FM nets as required.

138. Artillery Support Section

Organic to the direct support platoon, the artillery support section is attached to the division artillery headquarters during tactical operations. This section has FM and AM capabilities similar to those found in the combat support sections. In addition, one vehicular-mounted UHF radio is provided this section for operation in the air traffic control net or in the tactical air spot report receiver system.

139. Aerial Surveillance Platoon

The aerial surveillance platoon is composed of manned aircraft and drones. It provides immediately responsive aerial radar, visual, and photographic surveillance and target acquisition for general support of the division. This platoon employs FM and UHF radios in its aircraft and has FM and RATT radios mounted in its organic ground vehicles. Usually the radioteletype equipment is operated in the division intelligence net or the corps flight operations net.

140. Communication Facilities Provided by the Aviation Company

a. Command and Liaison. Command and liaison include extensive use of Army aviation for control and transportation. For example, a commander may effectively control his march columns from a helicopter above the route of march and he may land along the column for personal contact with subordinate commanders.

b. Radio Relay. The operational range of FM radios is extended by use of airborne stations. Aircraft of the aviation company used as airborne radio relay stations increase the effectiveness of FM radio communication over extended distances. In the armored division it is normal for a pilot or observer to act as a voice relay.

c. Air Wire Installation. Wire laying may be performed by both fixed wing and rotary wing aircraft for high speed wire installations over obstacles. The distance the wire may be laid is limited

only by the capability of the aircraft and capacity of the dispenser unit used. A wire thus laid will normally not be disrupted by armor vehicles, but it may be impossible to recover for future use.

d. Messenger and Courier Service. The use of aircraft for messenger and courier service is standing operating procedure within armor units. Such use greatly increases the speed and flexibility of this most secure means for the transmission of information and documents.

Section II. MILITARY POLICE COMPANY

141. General

The primary means of communication for the military police (MP) company is FM radio. Employment of this organization is flexible, and it may be broken down into platoons, detachments, patrols, or control points. The provost marshal exercises operational control of the company. Elements of the company will be located with the division command post, trains, traffic control points, POW areas, combat commands, and wherever else required.

142. Radio Communication

a. The provost marshal maintains a station in the *division command* or *staff net FM*, for contact with division headquarters. For control and coordination of traffic patrols in the division area, various elements of the company use the MP *company command net FM*, which is controlled by the company commander. The company commander also has an AM receiver for monitoring the *division warning broadcast net AM* (fig. 24).

b. Besides the company command net, the MP company commander may establish a *utility control net FM* for use in special situations. Radios are assigned on a basis of 4 vehicular sets and 2 portable sets per platoon. Vehicular-mounted, armor band radios are provided the provost marshal and the MP company commander. The company executive officer has one receiver-transmitter. For extending the range of these radios, special antenna equipment is provided—1 per platoon, 2 to the company headquarters, and 1 for the provost marshal.

(1) The MP *company command net FM* provides the primary means for command, control, and coordination of MP operations. The company commander places stations in this net as required throughout the division area to facilitate the military police mission. This net provides a flow of information among patrols, escorts, traffic control points, and related agencies.

(2) The *utility control net FM* is used by the military police to coordinate and control vehicular traffic through a defile, for riot control activities, and other such operations as require radio communication within a localized area.

143. Supplemental Means of Communication

a. In addition to normal armor use of supplemental means of communication, the MP company may use special means such as public address systems for control of POW's and large groups of personnel. Arm and hand signals used by MP's have been specially developed for traffic control. Extensive use is made of fluorescent paint and tape for lane or route marking.

b. Limited internal wire circuits may be established, but the division area communication system is used by MP elements for wire communication outside the company command post, POW inclosures, and traffic control areas. When a detachment is in support of a division unit such as a battalion or combat command and wire communication is required, the supported unit must furnish the equipment required for the operation of wire circuits.

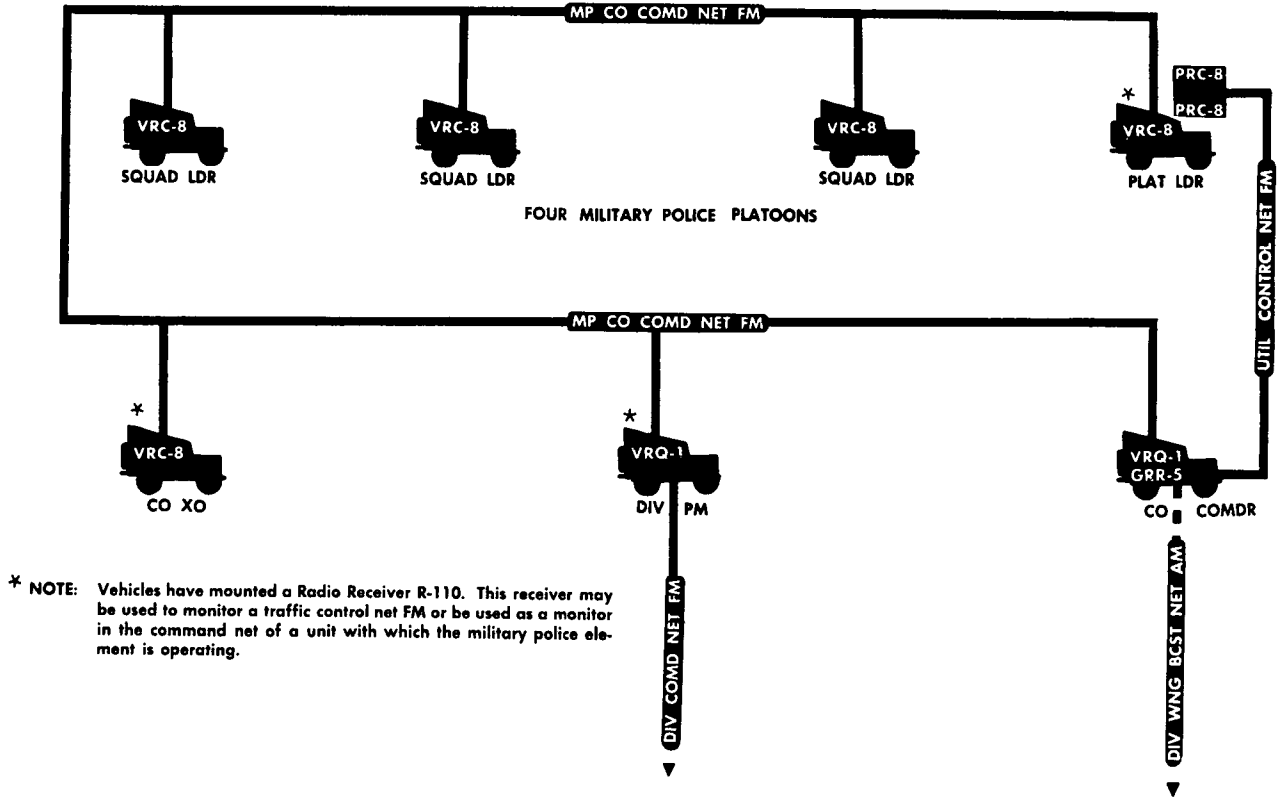


Figure 24. Type radio net diagram, armored division military police company.

CHAPTER 12

COMMUNICATION IN SEPARATE ARMOR ORGANIZATIONS

Section I. THE ARMORED CAVALRY REGIMENT

144. General

a. The armored cavalry regiment is organized and equipped to perform reconnaissance, security, and light combat missions. The regiment consists of a headquarters and headquarters troop, three armored cavalry squadrons, and an aviation company. The fundamental concept of organization is to provide the commander with the capability of employing his organic units intact without attachments, or by forming combined arms forces supported by organic artillery and Army aviation.

b. For details on the operation and organization of the armored cavalry regiment and subordinate elements, see FM 17–95.

145. Radio Communication to Higher Headquarters (fig. 25)

a. Higher Headquarters Command Net FM. This net provides voice radio facilities between the regimental commander, operations officer, and command post and the higher headquarters commander and his staff. When the regiment is employed with an infantry division, the division must furnish infantry band FM radios to the regiment to enable it to operate in infantry division FM radio nets.

b. Higher Headquarters Command Net RATT. To operate in this net a high power radioteletype team is furnished the regiment by the higher headquarters signal battalion. The station in this net is located within the regimental command post and provides a long range radioteletype link between the two headquarters for the purpose of conducting command traffic.

c. Army Logistical Net RATT. To operate in this net a high power radioteletype team is furnished the regiment by the higher headquarters signal battalion. This net is used to transmit logistical matters between the regimental logistics officer and army logistical agencies and staff sections.

d. Army Air Request Net RATT. To operate in this net a high power radioteletype team is furnished the regiment by the higher headquarters signal battalion. The station in this net is located at the regimental command post and is used for transmitting immediate and preplanned requests for close air support direct to army.

e. Higher Headquarters Warning Broadcast Net AM. An AM radio receiver located in the regimental S3 air armored personnel carrier monitors this net to receive air alerts, CBR attack warnings, fallout warnings, radiation data, and similar information of an urgent operational nature broadcast from higher headquarters.

146. Special Purpose Nets

a. Tactical Air Direction Net UHF. This net is used by a forward air controller (FAC) attached to the regiment for control of close air support. The FAC may operate in this net from a wheeled vehicle furnished by the regimental headquarters or from the regimental staff tank with a UHF radio.

b. Tactical Air Force Control-Coordination Nets. The air control team (including the FAC) has a medium power AM radio for operation in this net. This net is used for control and coordination of close air support between US Air Force elements. See paragraph 34 and figure 1 for details.

c. Spot Report Receiver System. The regimental S3 air has a UHF radio in his vehicle for monitoring this net, which provides the regiment with immediate reports from tactical aircraft in the area of operation.

147. Command Post Radio Communication, Armored Cavalry Regiment

(fig. 25)

a. The regimental headquarters operations, intelligence, air operations, and logistical sections armored personnel carriers are normally located within the regimental command post area. These vehicles are equipped with medium power AM radioteletype and FM radios to provide the regimental staff sections with the radio facilities required to perform their duties.

b. The radio communication required among elements of the regimental headquarters is provided by the following nets:

(1) *Regimental command net FM.* The net control station (NCS) for this net is located in the operations section armored personnel carrier. This net provides voice radio communication among the regimental commander, his staff, fire support representatives, and subordinate unit commanders.

(2) *Regimental command/intelligence net RATT.* The NCS for this net is also located in the operations section armored personnel carrier. This net provides an extended range radio link between the regimental and armored cavalry squadron command posts. In addition, the regimental aviation company and the two regimental liaison

officers operate stations in this net. It is particularly well suited for transmitting detailed orders and reports.

(3) *Regimental intelligence net FM.* The NCS for this net is located in the intelligence section armored personnel carrier. This net provides voice radio communication between the regimental and squadron intelligence officers. The aviation company may enter this net to conduct intelligence matters.

(4) *Regimental logistical net FM.* The NCS of this net is located in the armored personnel carrier provided for the regimental S1 and S4. This net provides voice radio communication between logistical elements of the regiment, squadrons, and aviation company. Radio messages pertaining to supply, administration, medical evacuation, maintenance, and transportation are normally transmitted on this net.

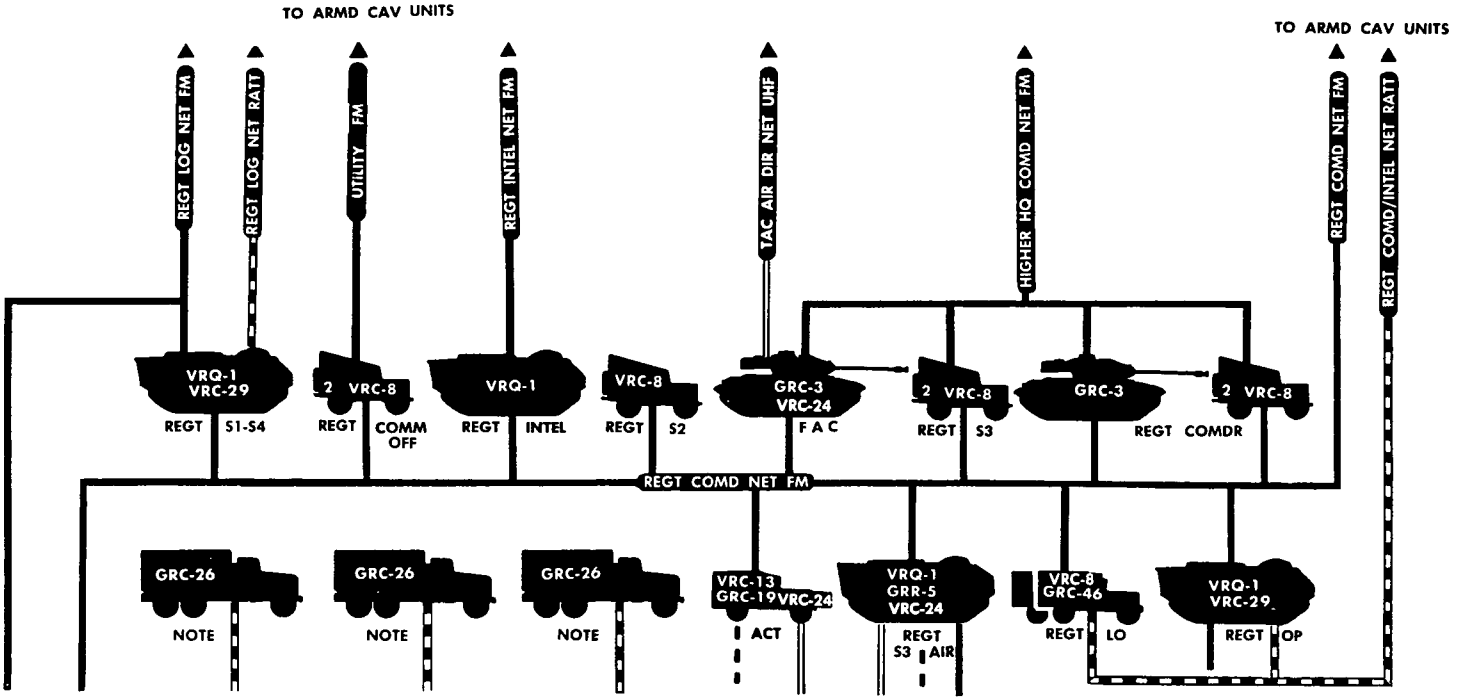
(5) *Regimental logistical net RATT.* The NCS for this net is also located in the S1-S4 sections armored personnel carrier. It provides an extended range radio link between logistical elements of the regiment and squadrons, and is used for the same purpose as the logistical net FM.

148. Wire Communication Within the Armored Cavalry Regiment

Wire communication is used to supplement radio whenever the situation permits and whenever time is available to install the circuits. Even though wire circuits may have been installed, radio is always held in readiness for operation. Adequate personnel and equipment are available in the regiment for the installation, operation, and maintenance of a complete wire network capable of integration with the radio system. Wire is usually extensively employed in stabilized situations.

149. Message Center Service

The regimental and the squadron command posts each operate a message center. Message processing and cryptographic and messenger services are provided by these message centers. Messenger service is normally provided from the higher headquarters to the lower echelons. The armored cavalry regiment will receive both scheduled and special motor and air messenger service from the higher headquarters. The aviation company provides aircraft and pilots for both scheduled and special air messenger service.


TO ARMD CAV UNITS
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REGT COMD NET FM
REGT COMD/INTEL NET RATT
VRQ-1 VRC-29
REGT S1-S4
2 VRC-8
REGT COMM OFF
VRQ-1
REGT INTEL
VRC-8
REGT S2
GRC-3 VRC-24
F A C
2 VRC-8
REGT S3
GRC-3
REGT COMDR
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NOTE
GRC-26
NOTE
GRC-26
NOTE
VRC-13 GRC-19 VRC-24
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VRC-8 GRC-46
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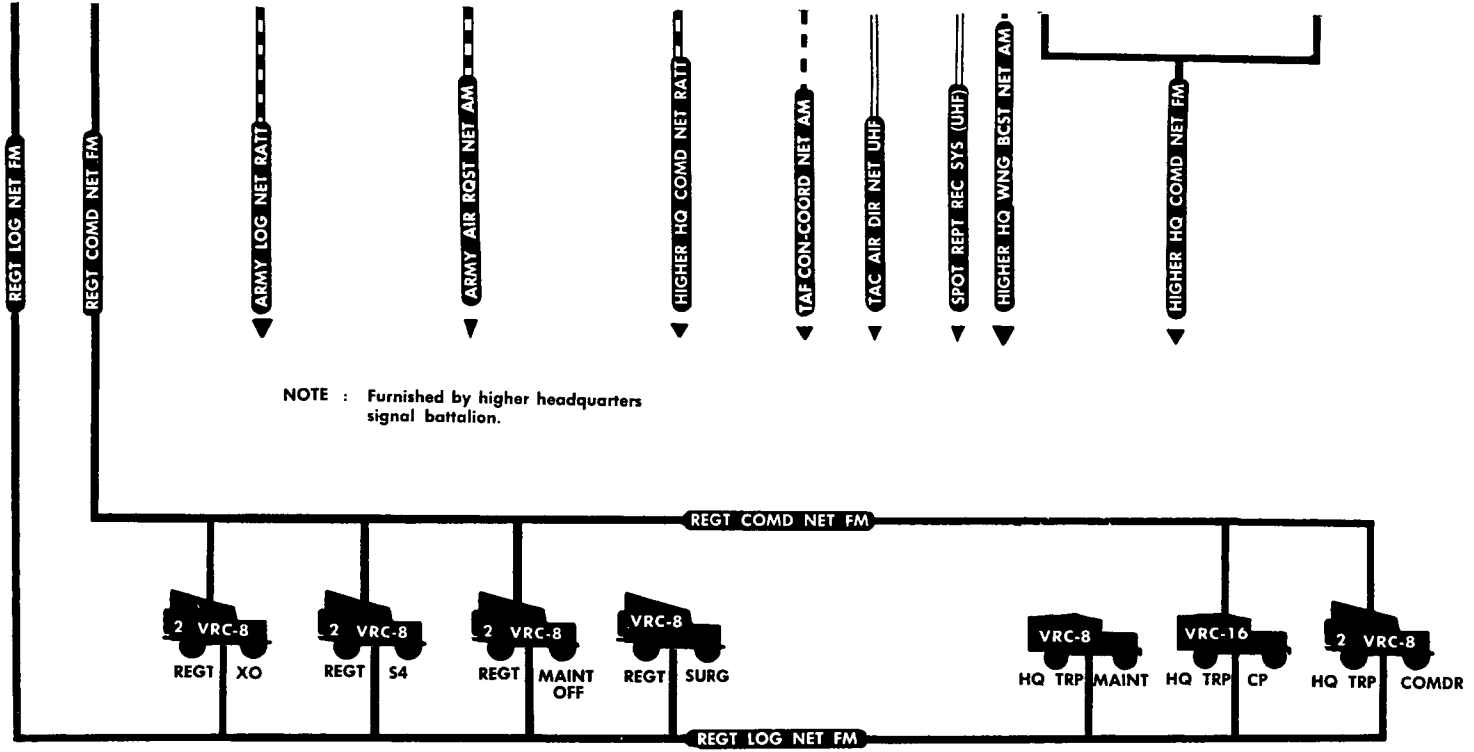


Figure 25. Type radio net diagram, headquarters and headquarters troop, armored cavalry regiment.

150. Visual and Sound Communication, Armored Cavalry Regiment

Visual and sound communication are used to the maximum within the regiment. Identification panels are used to identify vehicles and ground positions to friendly aircraft. Prearranged meanings are assigned in the SOI extract to pyrotechnic, light, flag, and sound signals. Generally, these are used to direct movement of small elements and for identification. Visual signals should be screened from enemy observation to keep from alerting the enemy of impending action. Sound signals are used primarily to give an alarm, attact attention, and transmit short messages of prearranged meaning.

151. Regimental Communication Support

a. The communication officer for the armored cavalry regiment is a member of the regimental staff and is assisted by the platoon leader of the regimental communication platoon.

b. The regimental communication platoon is organized and equipped along the general lines of a combat command communication platoon (pars. 13 and 62). However, additional personnel and equipment are assigned to the regimental communication platoon to support the communication system.

c. Support from higher headquarters includes:

(1) High-power RATT equipment with operating personnel for voice and RATT communication in a point-to-point circuit to the higher headquarters.

(2) Equipment and personnel are furnished by corps or army signal units when the situation requires entry into the area communication system of an army or division.

(3) Direct maintenance support for the regiment is normally furnished by field army direct support signal units.

152. Command Post Radio Communication, Armored Cavalry Squadron

(fig. 26)

a. The squadron operations, air operations, intelligence, communication, and logistical sections armored personnel carriers are normally located in the squadron command post area. These vehicles are equipped with medium power AM radioteletype and FM radio facilities to provide the squadron staff sections with the radio equipment required to perform their duties.

b. Radio communication facilities are provided to link the squadron command post to regiment in the regimental command/intelligence and logistical nets FM and RATT, as discussed in paragraph 147.

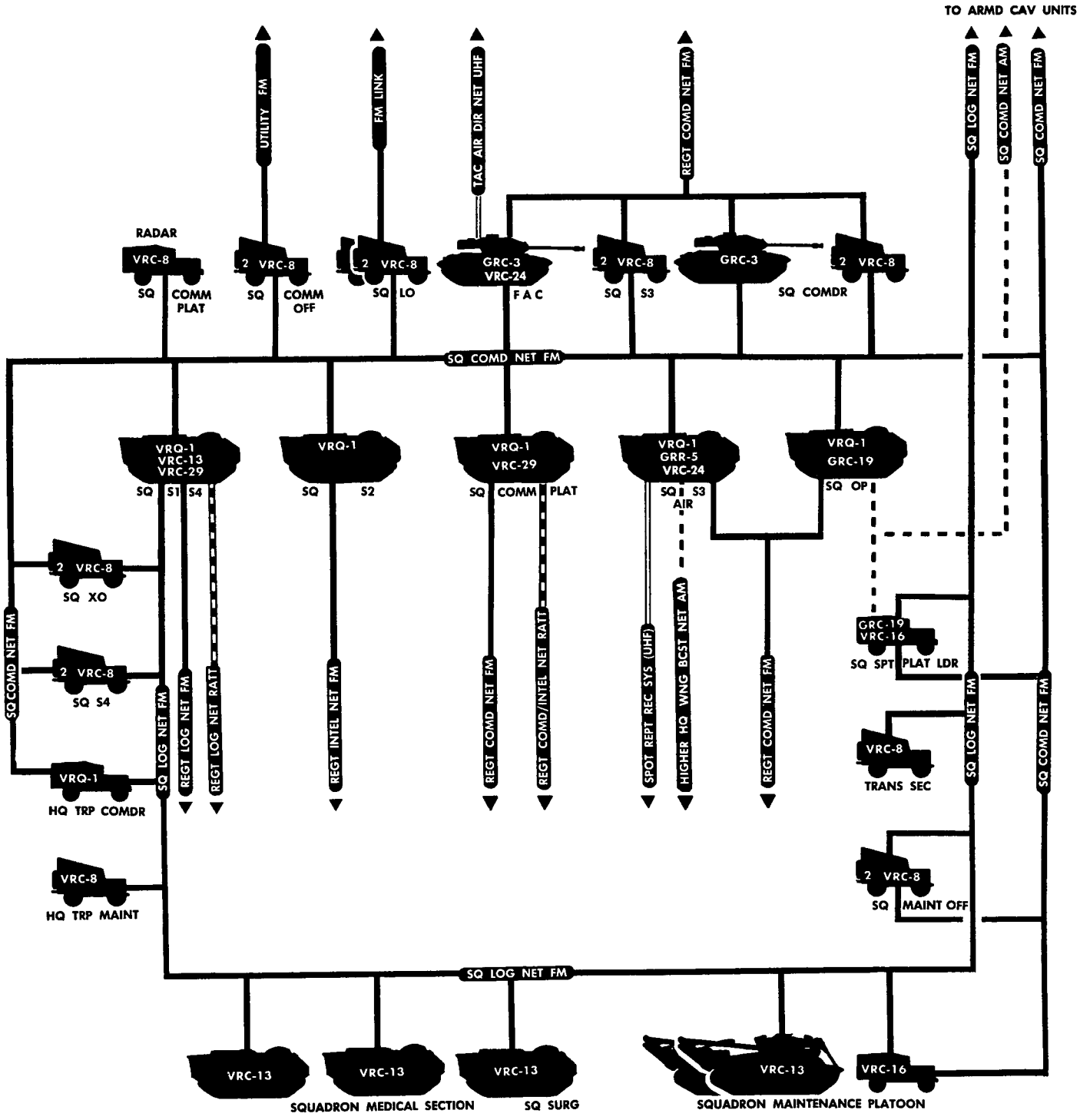


Figure 26. Type radio net diagram, headquarters and headquarters troop, armored cavalry squadron, armored cavalry regiment.

c. The radio communication required among elements of the squadron headquarters, fire support representatives, and subordinate headquarters is provided by the following nets:

(1) *Squadron command net FM.* The FM radio on the operations section armored personnel carrier is the NCS of the squadron command net FM. This net provides a communication link among the squadron commander, fire support representatives, the staff, and subordinate unit commanders. The squadron commander uses this net to command and control all elements of the squadron.

(2) *Squadron command net AM.* The AM radio in operations section armored personnel carrier is the NCS for the squadron command net AM. This net provides an extended range communication link among the squadron command post, armored cavalry troop and howitzer battery command posts, and the support platoon leader in the trains area. It is particularly well suited for transmitting detailed messages.

(3) *Squadron logistical net FM.* The FM radio in the squadron S1-S4 sections armored personnel carrier is the NCS for this net. The logistical net provides voice radio communication between the squadron logistical officer and all logistical elements of the squadrons.

d. When tactical air support is available to the squadron, the FAC is provided a tank from the squadron headquarters tank section, equipped with an air-to-ground UHF radio and an armor band FM radio. The FAC operates in the squadron command net FM to coordinate the tactical air effort with the squadron commander, and in the tactical air direction net UHF to direct tactical air strikes. The squadron S3 air is also equipped with a UHF radio in his armored personnel carrier to monitor the tactical air direction net UHF or the spot report receiver system.

153. Squadron Communication Support

The squadron communication officer is also the communication platoon leader of the squadron communication platoon. Communication support is comparable to that in the armored division armor battalion communication platoon (par. 13). As in the regimental communication platoon, additional equipment and personnel are required to support the armored cavalry squadron communication system.

154. Radio Communication, Armored Cavalry Troop

(fig. 27)

a. The armored cavalry troop commander normally commands his unit from the radio-equipped tank in the troop headquarters section or from his ¼-ton truck. The armored personnel carrier in troop headquarters section is equipped with FM and AM radios and serves as the troop command post vehicle.

b. The troop maintains communication with squadron in the FM and AM command nets and the FM logistical net as discussed in paragraph 152.

c. The radio communication required between the troop commander and elements of the troop is provided by the following radio nets:

(1) *Troop command net FM.* The commander of an armored cavalry troop commands and controls his unit over the troop command net FM. The troop commander, executive officer, platoon leaders, platoon sergeants, and troop headquarters operate radios in this net.

(2) *Platoon command net FM.* Each armored cavalry platoon has its own platoon command net FM. Each radio in the platoon operates in this net.

155. Radio Communication, Tank Troop

(fig. 28)

a. The tank troop commander normally commands his unit from one of the radio-equipped tanks of the troop headquarters section or from his ¼-ton truck. He is normally accompanied by an artillery forward observer who is mounted in the second headquarters section tank. The armored personnel carrier in troop headquarters (which provides transportation for the security section) is equipped with FM radio equipment only, and serves as the troop command post vehicle.

b. The tank troop maintains communication with squadron in the FM command and logistical nets discussed in paragraph 152.

c. The radio communication required between the troop commander and elements of his troop is provided by the following nets:

(1) *Troop command net FM.* The tank troop commander commands and controls his troop over this net. The troop commander, executive officer, platoon leaders, platoon sergeants, and elements of the troop headquarters operate radios in this net.

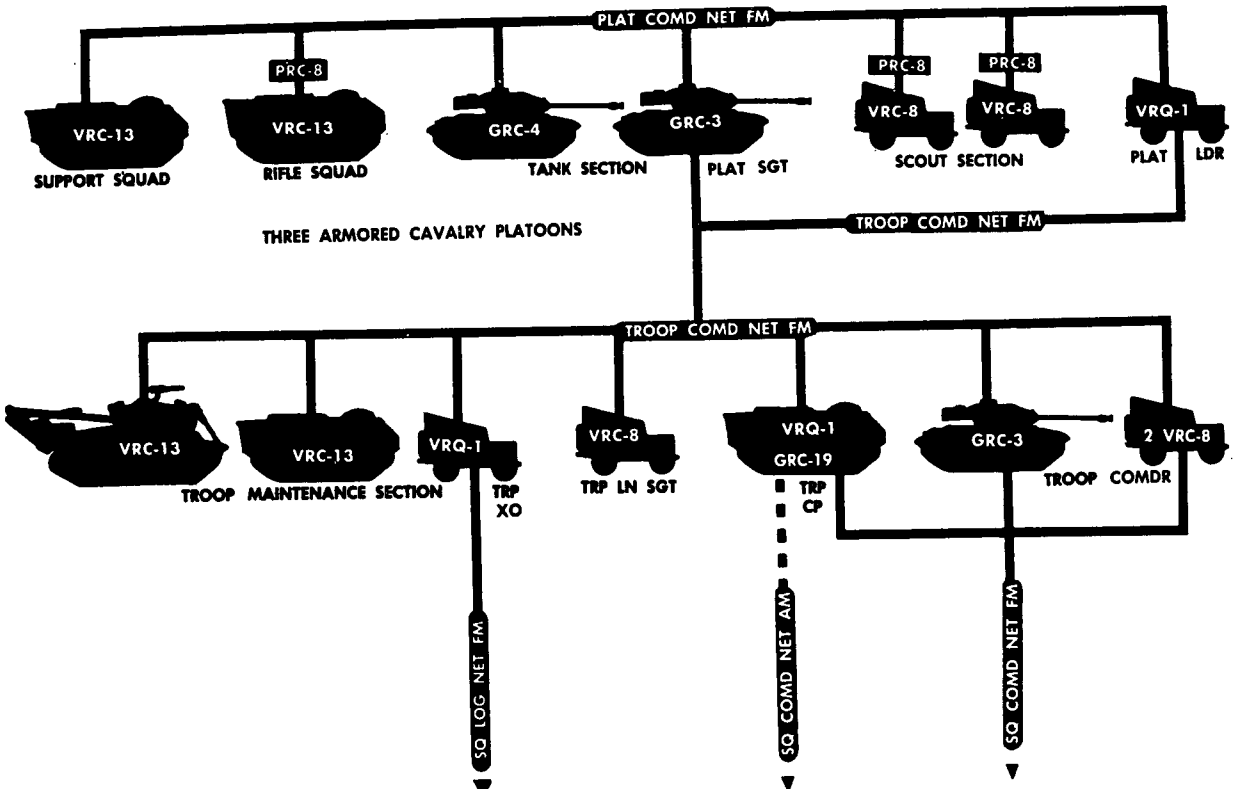


Figure 27. Type radio net diagram, armored cavalry troop, armored cavalry squadron, armored cavalry regiment.

(2) *Platoon command net FM.* Each tank platoon has its own platoon command net for command and control within the platoon and each tank operates in this net.

156. Radio Communication, Howitzer Battery (fig. 29)

a. The howitzer battery commander employs FM radio to command, and controls all elements of the battery. In addition, radio is the primary means of communication used to request and adjust fires for the supported elements of the squadron and to maintain contact with higher headquarters.

b. The howitzer battery operates radio links to the squadron headquarters in the command nets FM and AM and the logistical net FM as discussed in paragraph 152.

c. The radio communication required by the howitzer battery is provided by the following nets:

(1) *Battery command/fire direction net FM.* One net is operated within the howitzer battery for the joint purpose of command and fire direction. The battery commander uses this net for command traffic to the battery fire direction center, reconnaissance survey officer, command post vehicle, battery detail, and the three forward observers (FO). The forward observers use this net for fire direction traffic to the battery executive officer's command post.

(2) *Corps artillery survey net FM.* If the frequency for the corps artillery survey net is in the overlap band of frequencies, the survey team will operate in this net for coordination with other units in the area. The team also has common band portable sets that may be used for coordination within the battery.

(3) *Nets used by forward observers.* Each of the three FO's has a ¼-ton truck equipped with an FM radio, and each has also a portable FM radio. Each FO employs these two radios in the battery command/fire direction net and in the command net of the supported unit.

157. Radio Communication, Aviation Company, Armored Cavalry Regiment (fig. 30)

a. The radio communication system required by the aviation company must be extremely flexible and must provide many communication capabilities not normally required by other troop-level units of the regiment. Elements of the aviation company are

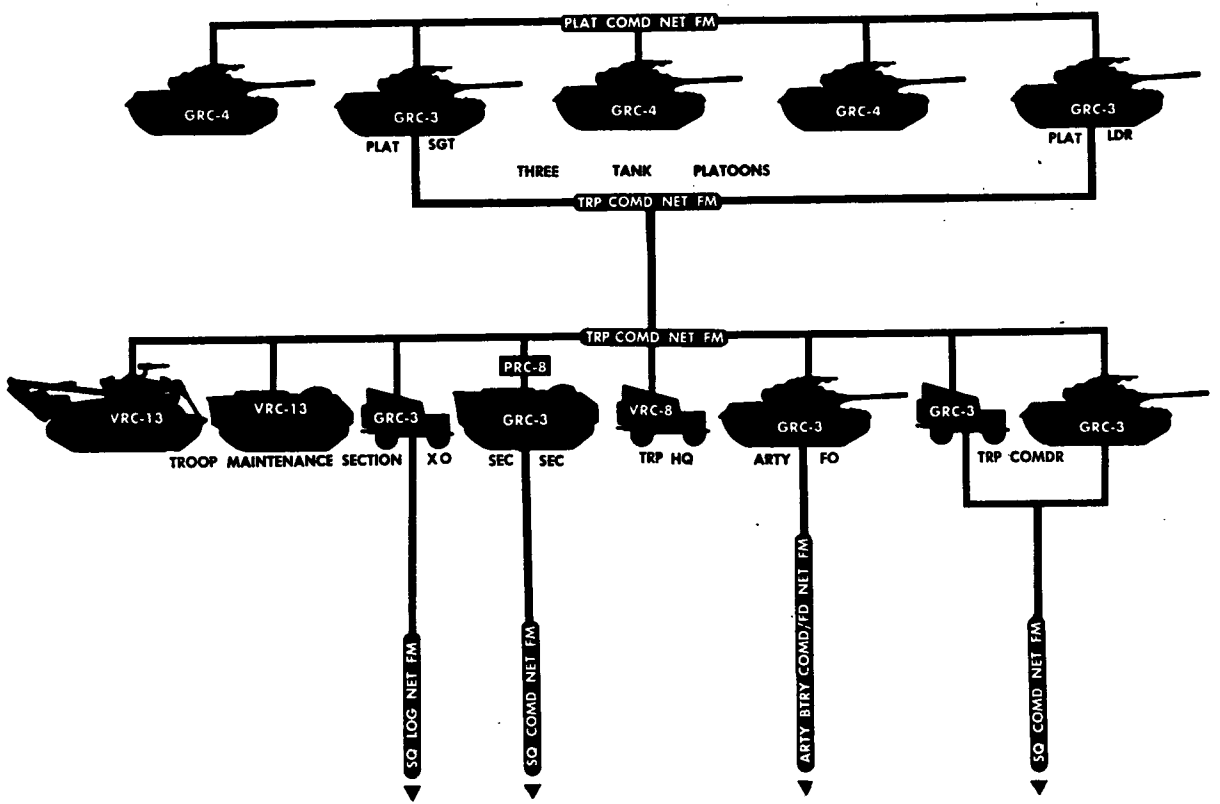


Figure 28. Type radio net diagram, tank troop, armored cavalry squadron, armored cavalry regiment.

capable of extended range voice radio communication from ground to ground, ground to air, and air to air. In addition to the requirement for radio communication to regiment, the aviation company must operate in certain corps radio nets to coordinate air activity.

b. The aviation company is equipped with medium power AM, RATT, and FM radio equipment, to fulfill their radio communication requirements. These radios are employed in the following radio nets:

(1) *Corps flight operations net RATT.* The communication section, located at the company airstrip, is equipped with medium power RATT equipment to operate in this net, to coordinate company air activity with the corps flight operations center.

(2) *Regimental command/intelligence net RATT.* The aerial surveillance platoon is equipped with medium power RATT equipment to operate in this net. Air and motor messengers will supplement electrical communication in this net for transmission of information and photographs.

(3) *Higher headquarters warning broadcast nets.* The aviation company communication section and aerial surveillance platoon are equipped with AM receivers to monitor a higher headquarters warning net to receive warnings concerning air attacks, CBR attacks, and other information of an urgent operational nature.

(4) *Corps artillery meteorological net AM.* The company operations monitors a meteorological net for information concerning weather. This information is rebroadcast on the company command nets on a schedule.

(5) *Nets to supported units.* Each of the aircraft in the company is equipped with a medium power FM radio to operate in the command net of the unit which they are supporting. The general support platoon leader and combat support section leaders also operate in the supported unit command net. UHF can be employed as a secondary means of air-to-ground communication with supported units having UHF capabilities.

(6) *Company command net FM.* This net provides voice radio communication among the company command, aerial surveillance platoon leader, drone section leader, general support platoon leader, the combat support section leaders, and elements of company headquarters.

(7) *Company command net AM.* This net provides extended range voice or CW radio communication among the dispersed elements of the company. To operate in this net

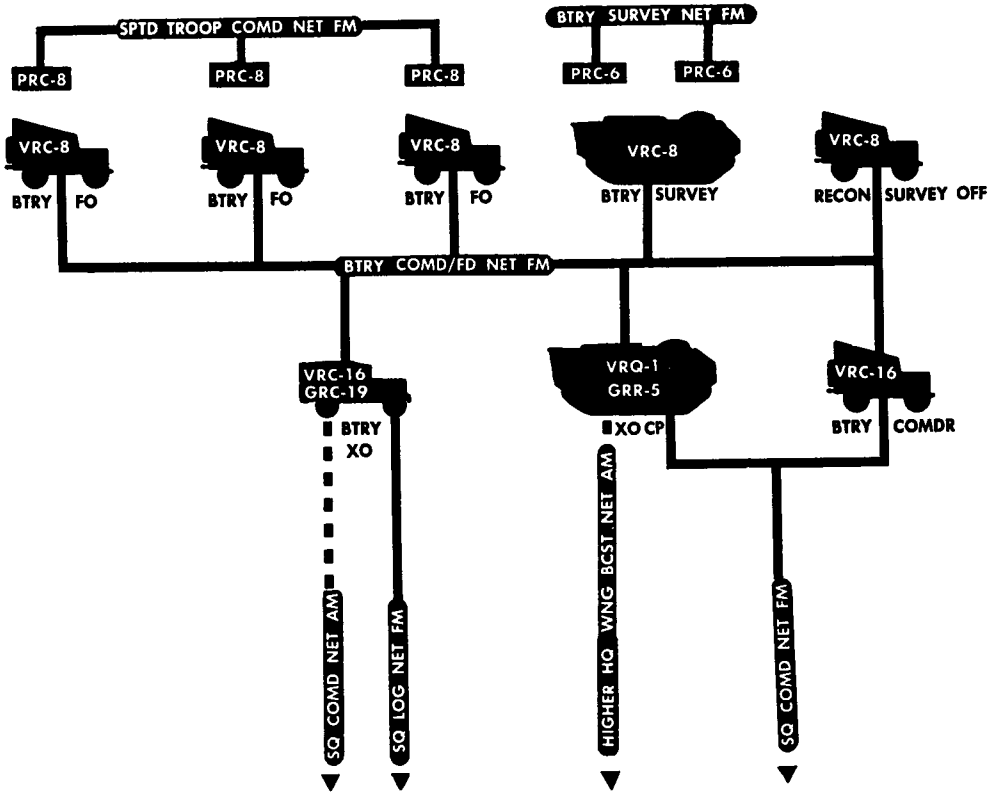
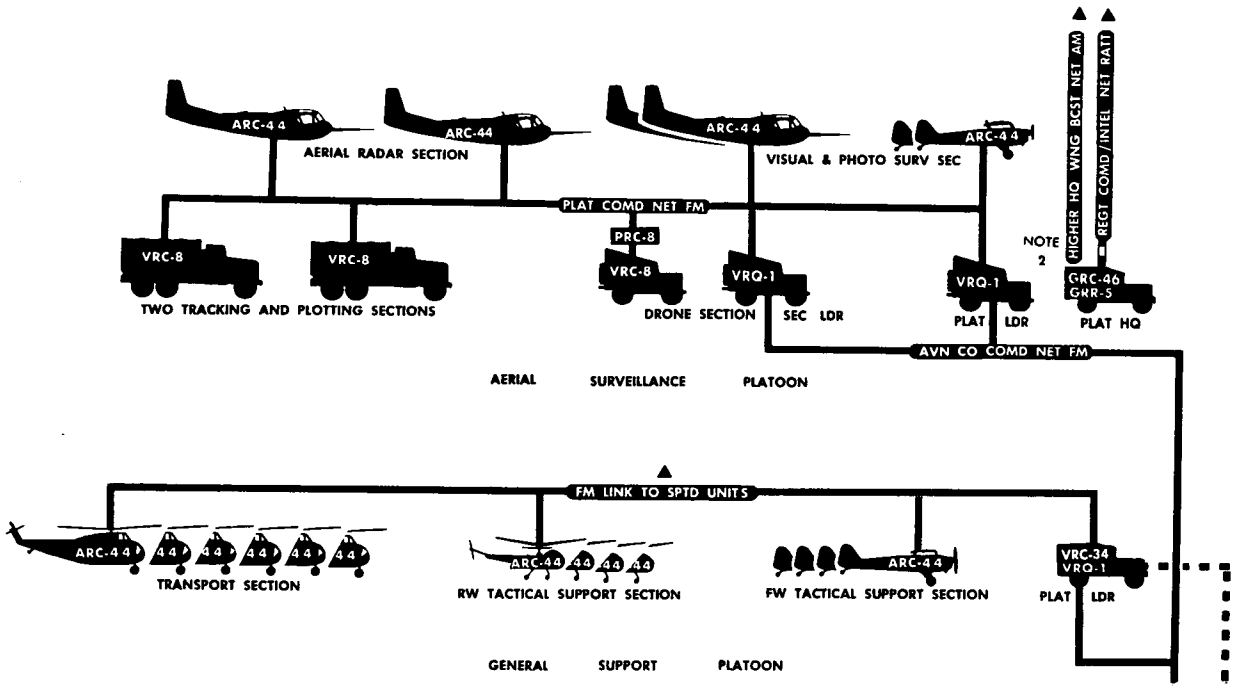


Figure 29. Type radio net diagram, howitzer battery, armored cavalry squadron, armored cavalry regiment.


ARC-44
ARC-44
AERIAL RADAR SECTION
ARC-44
VISUAL & PHOTO SURV SEC
ARC-44
HIGHER HQ WNG BCST NET AM
REGT COMD/INTEL NET RATT
PLAT COMD NET FM
NOTE 2
VRC-8
VRC-8
TWO TRACKING AND PLOTTING SECTIONS
PRC-8
VRC-8
VRQ-1
DRONE SECTION
SEC LDR
VRQ-1
PLAT LDR
GRC-46
GRR-5
PLAT HQ
AVN CO COMD NET FM
AERIAL SURVEILLANCE PLATOON
FM LINK TO SPTD UNITS
ARC-44
TRANSPORT SECTION
ARC-44
RW TACTICAL SUPPORT SECTION
ARC-44
FW TACTICAL SUPPORT SECTION
VRC-34
VRQ-1
PLAT LDR
GENERAL SUPPORT PLATOON

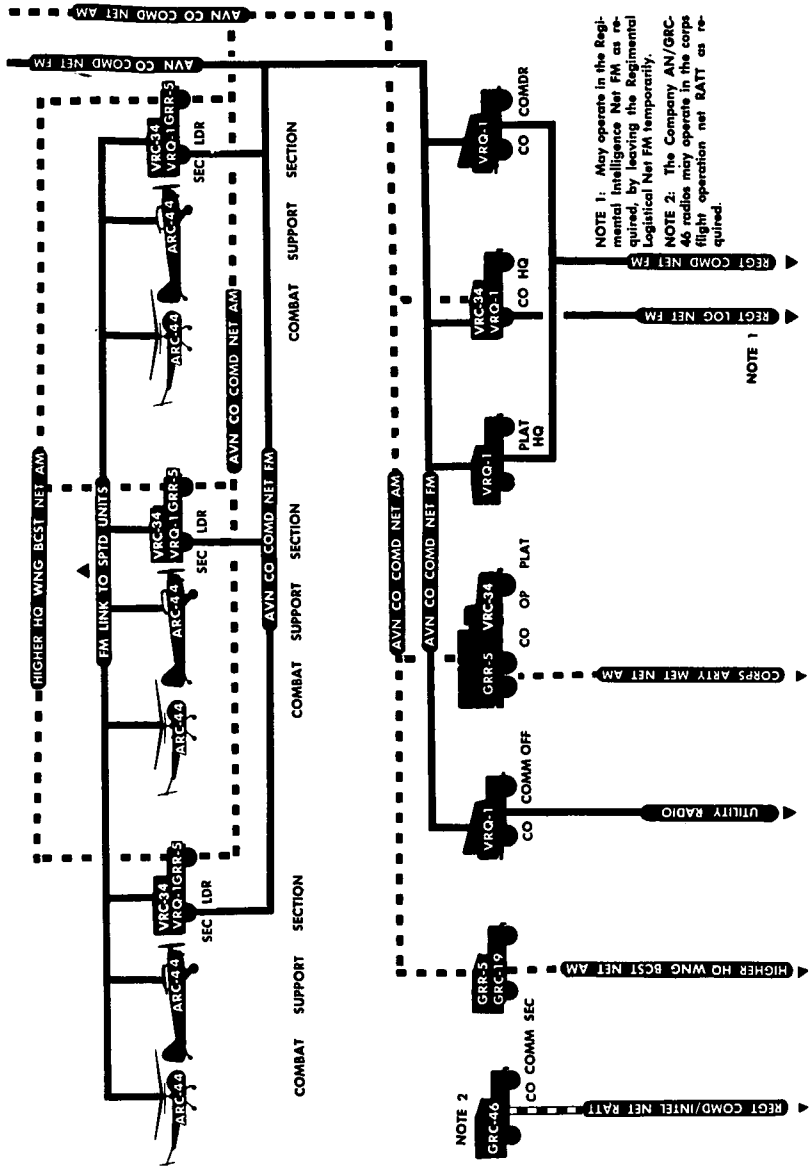


Figure 30. Type radio net diagram, armored cavalry regiment aviation company.

medium power AM radios are authorized in the company operations platoon, company command post vehicle, general support platoon headquarters, and each combat support section headquarters.

(8) *Aerial surveillance platoon command net FM.* This net is employed by the aerial surveillance platoon leader for command and control of all elements of his platoon. The platoon headquarters, aerial radar section, visual and photo surveillance section, tracking and plotting sections, and drone section operate radios in this net.

(9) *Air traffic control net UHF.* This net is operated from the base airstrip under control of the air traffic control officer. It is used for communication among airborne aircraft and from aircraft to the base airstrip.

Section II. ARMOR GROUP

158. General

a. The armor group in a corps or field army consists of a headquarters and headquarters company and one or more separate armor battalions or units with specialized armor equipment attached. The mission of the headquarters and headquarters company is to command, control, and supervise these attached units and operate the armor section of a corps headquarters when required.

b. Like the armored division combat command, the armor group is a tactical headquarters exercising command and control of such attached elements as may be allocated or assigned. The group headquarters does not have armored vehicles.

159. Radio Communication

(fig. 31)

a. General. The armor group operates both FM and AM radio nets to subordinate elements. FM nets are operated in the infantry band of frequencies, and attached armor battalions operate AM equipment (basic portion of the RATT radio) by voice or CW as desired by the group commander. Nets to higher headquarters are operated by signal units from higher headquarters (normally corps) on high power point-to-point radioteletype circuits.

b. Group Command Nets FM and AM. These nets are under operational control of the group operations officer. The discussion of combat command nets applies to these nets (substitute the group AM net for the combat command RATT net).

c. Group Logistical Nets FM and AM. This net is controlled by the group S4/maintenance officer, in coordination with the S1, for logistical and administrative purposes. The group may operate directly with army logistical agencies.

160. Supplemental Means of Communication

The use of supplemental means of communication in the armor group is similar to their use in the combat command. The group does not have a combat command area support platoon as found in the armored division. For long distance wire purposes, normally corps signal units furnish entry into the corps command communication system.

161. Communication Support

a. The armor group communication section is organized and equipped similarly to the combat command communication platoon

(pars. 13 and 62). Major differences are a result of the employment of AM rather than radioteletype equipment and of the limited amount of equipment organic to the armor group. The communication chief is the leader of the communication section, while the group communication officer exercises operational control over communication operations.

b. Normally, the field operations company of the corps signal battalion furnishes the armor group a radio relay link into the corps command communications system. High power radioteletype equipment and operating personnel are provided by army or corps signal units as required for operation in command, intelligence, and logistical systems of the higher headquarters. Third-echelon signal maintenance is furnished by field army signal units.

Section III. SEPARATE ARMOR (TANK) BATTALIONS

162. General

The separate armor (tank) battalion is organized and equipped in the same manner as the armored division armor battalion. FM equipment is operated in the infantry band of frequencies. Assignment of this organization is to a field army, and it is usually subordinate to an armor group (pars. 37–48 and 158–161).

163. Communication System

a. The communication system organization and equipment allocation for the separate armor battalion is the same as that of the armored division armor battalion.

b. Operation of the separate armor battalion communication system is different only in that FM radio equipment is operated in the infantry band of frequencies. However, all other operation of the internal communication system is the same as previously discussed.

c. Communication to higher headquarters will be slightly different because this battalion is normally assigned to army or attached to corps or to an armor group. When operating directly under corps or army, the battalion establishes communication links to higher headquarters by use of organic radioteletype equipment, supplemented by such equipment as required from corps or army signal units. This equipment may include high power radioteletype and radio relay equipment. When the battalion is attached to an armor group, the teletype portion of the radioteletype equipment normally will not be used and communication will be by AM and FM radio as discussed in paragraph 159.

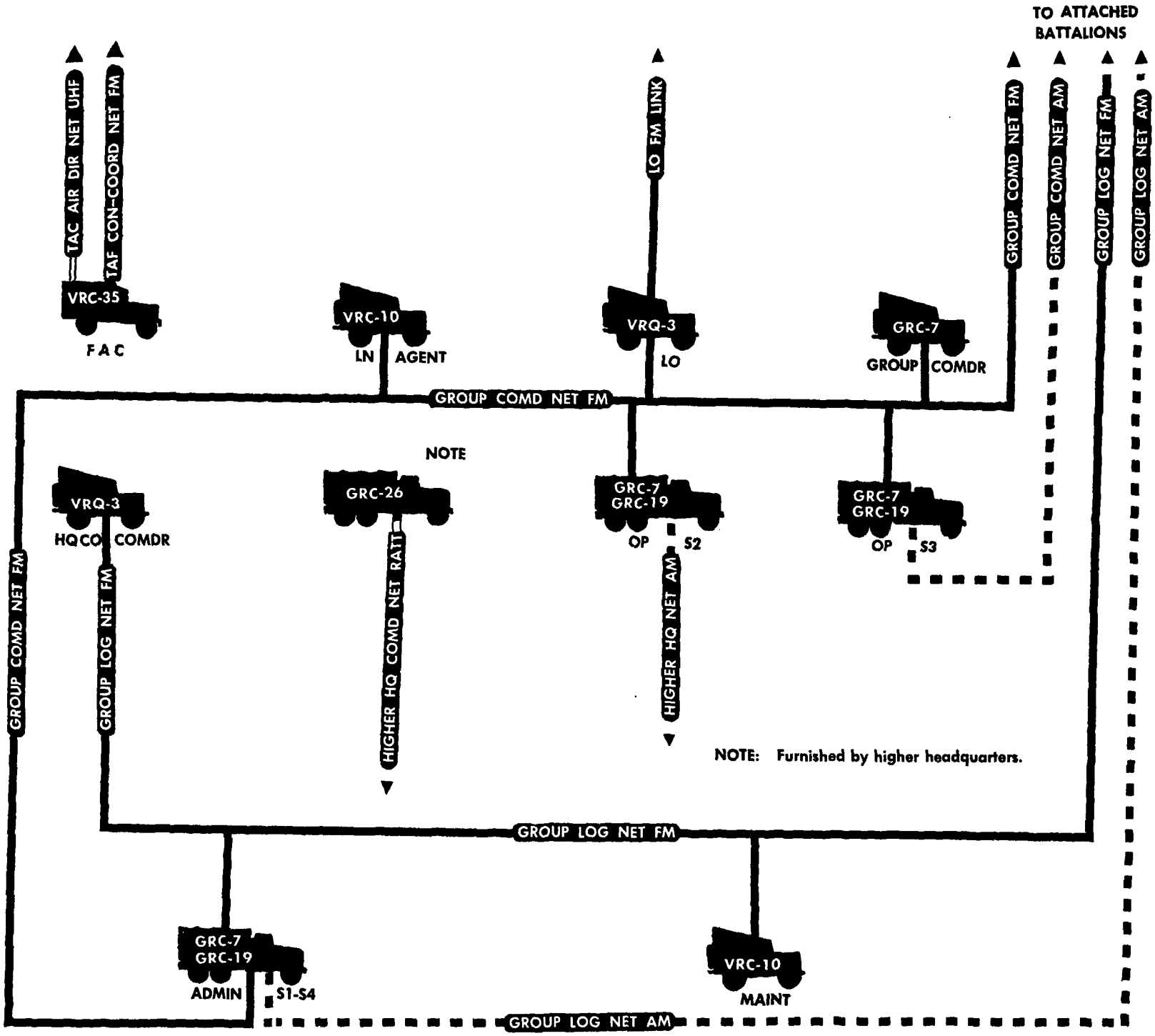


Figure 31. Type radio net diagram, headquarters and headquarters company, armor group.

Section IV. INFANTRY DIVISION ARMOR UNITS

164. General

Armor units organic to an infantry division include the armor battalion and cavalry squadron. In addition, each battle group has an organic reconnaissance platoon that has the same organization and communication system found in the armored cavalry platoon.

165. Communication System

Details of the communication system employed by armor units of the infantry division are covered in FM 7–24. A study of armored division armor units equivalent to infantry division armor units will aid in effectively planning and operating the unit communication system. Where conflicts occur, FM 7–24 will prevail.

Section V. AIRBORNE DIVISION CAVALRY TROOP

166. General

The airborne division cavalry troop is organized and equipped to conduct reconnaissance, surveillance, and limited security missions for the airborne division. It contains no armored vehicles, but operates and communicates in a manner similar to armored cavalry units. It may participate in air landed or parachute operations into the objective area. This troop consists of a troop headquarters and five reconnaissance platoons. The troop is fully mobile by wheel vehicles, and may perform missions involving Army aircraft support from the division aviation company. Radioteletype, AM, and infantry band FM radio equipment is organic to the troop.

167. Radio Communication

(fig. 32)

a. Radio communication to the airborne division headquarters is accomplished in the following nets:

(1) *Division assault net FM.* This net is used by the division headquarters for communication to subordinate stations during initial phases of the airborne assault. It is monitored by the cavalry troop commander (normally with a portable radio) until it is replaced by normal radio nets.

(2) *Division command net no. 1 AM-RATT.* This net is used for operational command and control of close-combat elements of the division. A ¾-ton truck with RATT equipment operates in this net from the troop command

post. It provides an extended range RATT and voice communication link from division operations to the cavalry troop.

(3) *Division intelligence net AM.* This net operates as a radiotelegraph (CW) or voice net from the division intelligence section to subordinate elements. The cavalry troop operation section maintains a station in this net.

(4) *Division commander's net FM.* This voice FM net provides a direct channel of communication between the division commander and units operating directly under division control. When the cavalry troop is under division control, the troop commander maintains a station in this net ((1) above).

(5) *Division administrative net RATT.* This net is used by elements of the division for administrative and logistical traffic. When required and authorized, the troop RATT equipment may be used in this net temporarily.

b. The cavalry troop operates a *troop command net FM* for command, intelligence, and logistical matters. The net is controlled by the troop commander or his operations section at the troop command post. Also operating in this net are elements of the troop headquarters, liaison personnel, reconnaissance platoon leaders under troop control, and attached or supporting units.

c. Each reconnaissance platoon operates a *platoon command net FM* for internal communication. The four scout squads have one portable and one vehicular-mounted FM radio each while the antitank squad has only one vehicular-mounted FM radio.

d. When a reconnaissance platoon is attached to an airborne battle group, the platoon leader enters the *battle group command net FM* for contact with other elements of the battle group. This net is controlled by the battle group commander and his staff.

168. Supplemental Means of Communication

a. General. Supplemental means of communication employed by the airborne division cavalry troop include wire, messenger, sound, and visual means. These means are used as prescribed in FM 21–60 and FM 7–24. Additional discussion of these means is found in chapter 1.

b. Liaison. The troop headquarters liaison section provides liaison between troop and division headquarters, aviation company, and battle group. The liaison agents may be used for transmission of bulky material.

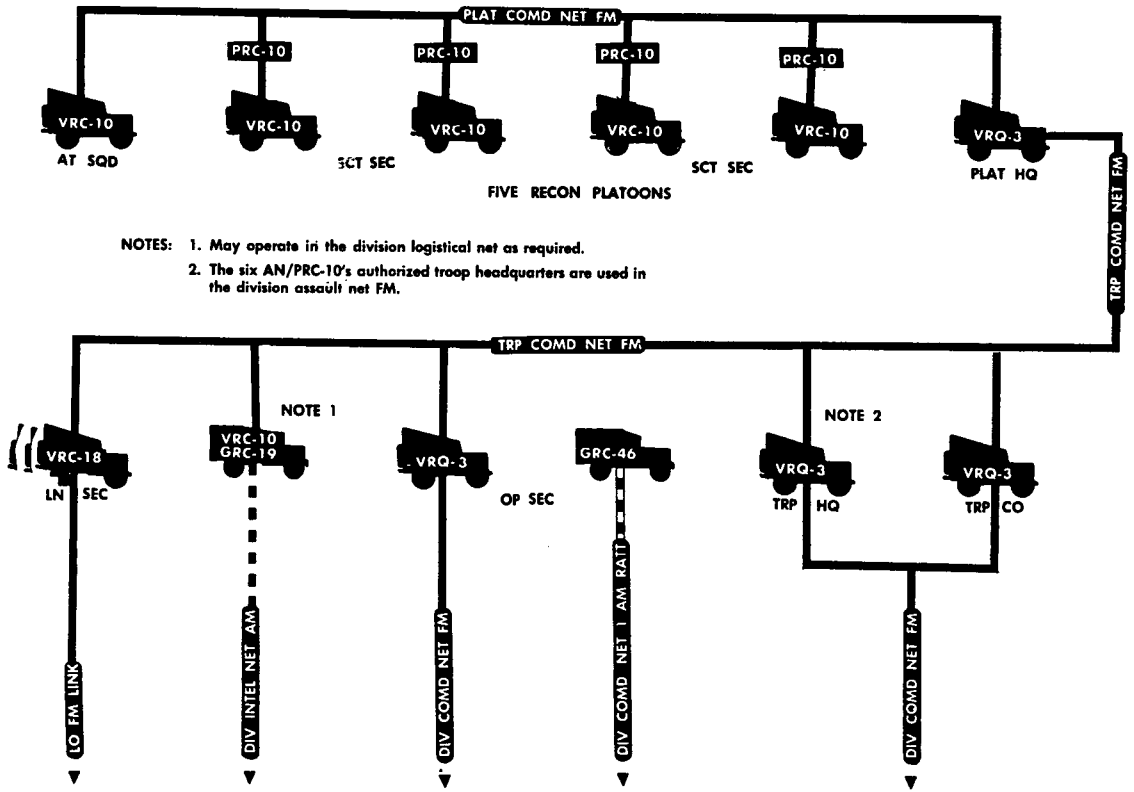


Figure 32. Type radio net diagram, airborne division cavalry troop.

169. Communication Support

a. Communication specialists assigned to the troop operations section include a communication chief, intermediate speed radio operators, and a switchboard operator. The troop headquarters section has a team for operation of the radioteletype equipment. Radiotelephone operators are not considered communication specialists.

b. The communication chief assists the operations officer in planning communication activities and supervises the troop communication operations. During airborne operations second-echelon maintenance is limited to such repairs as can be accomplished by the communication chief. Two spare receiver-transmitters are authorized for a major item float. Additional maintenance assistance may be obtained from the emergency repair company of the maintenance battalion, division support group.

Section VI. ARMORED AMPHIBIOUS BATTALION

170. General

a. The armored amphibious battalion is organized and equipped to provide close, continuous, direct-, and indirect-fire support during waterborne assaults. It is organized into a headquarters and headquarters company and three armored amphibious companies. The main armament of the battalion is lightly armored, self-propelled, amphibious howitzers. Communication equipment of the headquarters is comparable to that of the armored division armored infantry battalion, while that of the line companies is comparable to that of the tank company of the armor battalion. FM radio equipment operates in the infantry band of frequencies.

b. For details concerning organization and operation of the armored amphibious battalion, see FM 17–34. For details concerning operation as howitzers see applicable artillery field manuals.

171. Headquarters, Armored Amphibious Battalion, Communication

(fig. 33)

a. Communication to higher headquarters is primarily by radio during amphibious operations. The headquarters has an organic capability of entering three higher headquarters RATT nets (usually command, intelligence, logistical, or fire direction) and such FM nets as are required. One AM receiver is provided for monitoring a warning broadcast net AM. Higher headquarters will supplement radio communication by employing wire, messenger, visual, and sound signals as applicable.

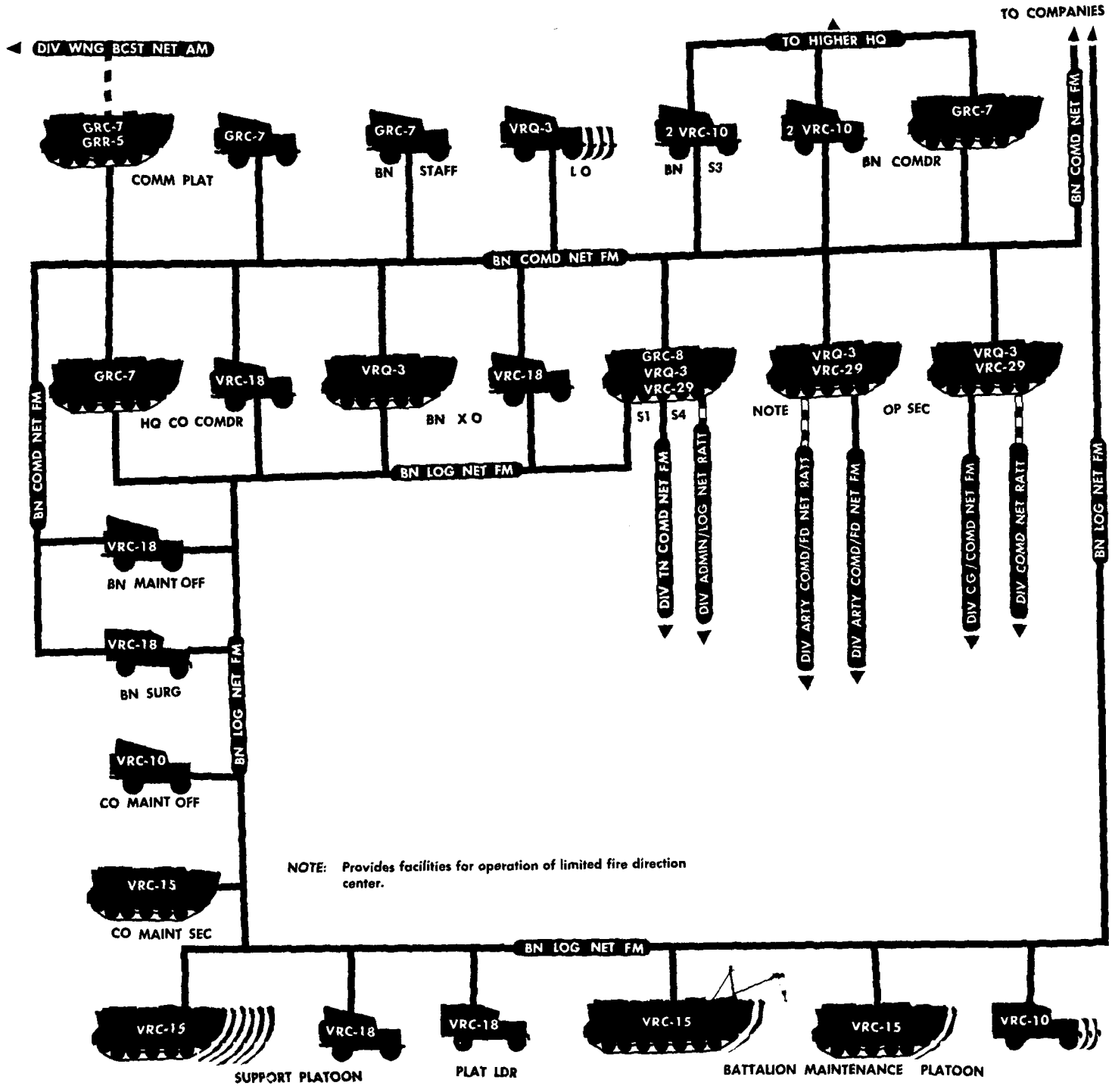


Figure 33. Type radio net diagram, headquarters and headquarters company, armored amphibious battalion.

b. Internal battalion communication is accomplished using all means of communication, but again FM radio is the primary link from battalion to subordinate elements. Radio nets of the battalion headquarters are as follows:

(1) *Battalion command net FM.* This net provides direct voice communication from the battalion commander and his staff to organic, attached, and supporting units. The net control station is operated under direction of the battalion operations officer for command and control of the battalion, interstaff coordination, and intelligence purposes. When battalion operations is functioning as a fire direction center, this net is used as a fire direction net, and other traffic may be shifted to the logistical net.

(2) *Battalion logistical net FM.* This net is used for administrative and logistical purposes under control of the S1 and S4 sections. Administrative and logistical personnel of the battalion operate stations in this net, which also provide radio communication in and to the battalion trains. As noted in (1) above, this net may be used for other purposes.

c. Organization and operation of the battalion communication platoon are comparable to those of the armored division armored infantry battalion communication platoon (pars. 13 and 41).

172. Armored Amphibious Company Communication

(fig. 34)

a. Communication to higher headquarters from the armored amphibious company depends on its mission. The company may operate under battalion control or it may be attached to or placed in direct support of an amphibious unit or an infantry division battle group during waterborne operations.

(1) When under control of the amphibious battalion, the company will operate in the battalion command and logistical nets FM.

(2) When part of amphibious operations under infantry division battle group, the company must include in its communication links radio stations operated in the *battle group command net FM* and the *mortar platoon fire control net FM.* If infantry division artillery units are active with the battle group, coordination may be accomplished in the mortar platoon net or in an artillery fire control FM net. Close coordination, liaison, and communications must be maintained with the battle group mortar platoon and assault weapons platoon.

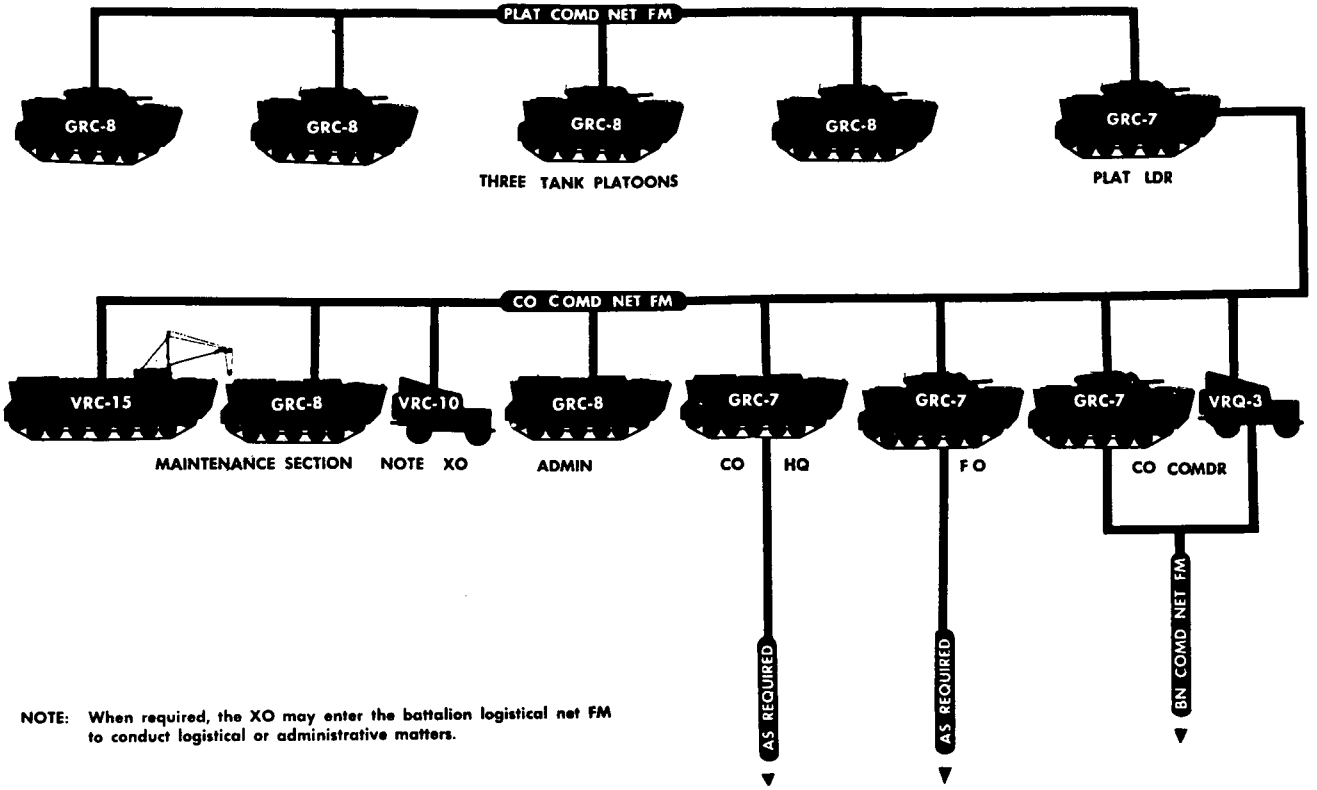


Figure 34. Type radio net diagram, armored amphibious company.

b. Internal communication organization and operation are comparable to those of the tank company system (par. 45). The company operates a command net FM that is used by elements of the company headquarters and provides a link to armored amphibious platoon leaders operating under company control. This command net handles command, intelligence, logistical, and fire control traffic. Each of the three platoons maintains its own command net for internal communication and fire control.

c. Communication support organic to the company consists of a communication chief, a radio mechanic, switchboard operator, and wireman. The concept of company communication support is similar to that of the tank company, but use of wire follows the pattern of artillery units (pars. 80 and 88).

CHAPTER 13

COMMUNICATION TRAINING, LOGISTICS, AND ADMINISTRATION

Section I. TRAINING

173. General

Armor commanders at all echelons are responsible for communication training of personnel in their commands. The signal or communication officer will advise and assist in the planning and preparation of the training program and schedules for communication specialists and for general communication training of personnel, in coordination with the G3 or S3. The efficiency of a communication system is directly proportional to the proficiency of the personnel who operate the communication equipment. This proficiency is attained and maintained through carefully planned, realistic, and continual training that stresses and develops teamwork. Such training must apply to all personnel who engage in communicating, and not solely to communication specialists. Training is governed by appropriate Army training programs and organization training publications. Maximum use must be made of integrated and concurrent training so that techniques become automatic. Communication specialist training should be conducted so as to provide skills in related fields.

174. Specialist Training

a. General. Communication specialists are those individuals who have received technical training before they are qualified to perform the duties of their MOS. This training is normally conducted at service schools and, in some case, at unit schools or in an on-the-job training program. Specialists in armor units include communication chiefs, radio mechanics, radioteletype operators, intermediate speed radio operators, and some crytographic personnel. Other communication personnel such as message center personnel are not considered specialists, but they do require training in communication techniques. Unit communications officers screen records in coordination with applicable commanders and staff members to select individuals with qualifying aptitudes to attend specialist training.

b. Service Schools. Communication specialists should be trained at established service schools to obtain the best results in the shortest possible time. When circumstances or limited quotas delay a unit from sending individuals to a school, these individuals will be unit-trained in related specialties until attendance at a service

school is possible. If all of the technical specialists cannot be service school trained, commanders should phase the individuals into available quotas so that when the school trained personnel return to the unit, they may be used to train additional personnel. Guidance for this training is contained in Army subject schedules numbered according to the appropriate MOS.

c. Unit Schools. Commanders may establish unit schools to improve or standardize communication techniques, and to train unit personnel in communication specialties.

d. On-the-Job Training. Training of communication personnel in an on-the-job program involves placing selected and qualified personnel, with adequate supervision, in a position to produce trained personnel in the desired skills. When personnel are to be trained in an MOS not requiring service or unit school attendance, on-the-job training is used. If selected personnel are to be sent to a school in the future, on-the-job training in related fields prior to attendance at the school will benefit the unit. Instruction for on-the-job training should be based on the MOS and job description applicable to positions involved.

175. General Communication Training

a. General communication training includes subjects such as operation of equipment, radiotelephone procedure, use of SOI items, and other communication subjects required by users of equipment organic to the unit. This training is a command responsibility and is conducted during scheduled instruction by qualified unit personnel. All unit personnel who use communication facilities should receive training. Individuals whose duties require extensive use of communication facilities must receive detailed training.

b. Additional training is required periodically for refresher purposes and when new equipment is received or when new procedures are put in use. During basic combat and advanced individual training phases of a training cycle, formal classes in communication subjects are prescribed in unit Army training programs. Generally during unit training phases, formal communication classes are not scheduled; therefore, integrated or concurrent training must be used as a training vehicle for communication practical exercises.

Section II. ARMOR SIGNAL LOGISTICS

176. General

a. Signal logistics is a command responsibility and the commander is responsible for procurement, storage, transportation, distribution, maintenance, and evacuation of signal supplies and equipment.

b. Based on command policies, the current and future tactical situation, signal and communication officers must plan continuously and take prompt action in their area of logistical responsibility in coordination with other staff officers. Enforcement of specific supply instructions and frequent inspections to insure adequate logistical support assist in maintaining effective unit communication.

177. Supply

a. Maintenance of an efficient signal supply system and enforcement of its procedures provide the armor commander with the necessary signal items for successful operations. The supply system is designed to insure units authorized supplies. See AR 730–30.

b. The signal supply system provides expeditious handling of requisitions and issues of signal items. The system is adaptable to both automatic data and manual processing. Procedures are as follows: an armor battalion or separate company prepares the requisition form and forwards it to the field army signal unit supporting the area. The signal unit fills the requisition immediately if the item is on hand; if not, the requisition is transmitted to field army stock control center, where the requisition is processed and transmitted to the field army signal depot that will ship the item to the using unit. The system is designed to reduce stock levels in combat areas and army supply depots and to provide fast request channels, central stock control, and minimize manual editing of requisitions. Provisions for entry into the electronic transmitting system is furnished by field army signal units at a division signal center.

178. Maintenance

a. General. Maintenance is action taken to maintain materiel in serviceable condition or to restore it to serviceability. Consistent with the primary objective of providing effective and economical support of combat operations, tools and repair parts are issued to units whose capabilities permit effective, efficient, and economical use of these items. As a general practice combat units must be relieved of unnecessary maintenance functions in order to focus

maximum attention on combat operations. Echelons of signal maintenance are therefore established in accordance with the primary mission of the unit. The echelons of signal support are based on the degree of maintenance that can be accomplished within a unit and the extent of communication maintenance that can be expected from higher headquarters. Based on this concept, maintenance has been divided into three catagories: organizational, field, and depot. Depot maintenance is beyond the scope of armor unit maintenance and is covered in appropriate publications. Organizational and field maintenance is discussed below; but generally the level of maintenance that can be performed by a unit is limited by the tools, test equipment, personnel, parts, and time available. No echelon of maintenance will perform the work of a higher echelon at the expense of accomplishing its own assigned function.

b. Organizational Maintenance.

(1) Organizational maintenance on its own equipment is performed by, and is the responsibility of, the using organization. This maintenance consists of both first- and second-echelon maintenance. Preventive maintenance, an essential part of organizational maintenance, is the systematic care, servicing, and inspection of equipment for the purpose of maintaining it in serviceable condition, detecting potential failures of equipment, and, consequently, taking corrective measures before the failures occur.

(2) First-echelon maintenance is the heart of preventive maintenance and is performed by the operator or user of signal equipment. In armor units a memory device—FITCAL—is used during maintenance periods. These letters mean *feel, inspect, tighten, clean, adjust,* and *lubricate.* These services must be performed systematically and regularly on signal equipment and any trouble discovered is referred to the organizational communication specialists. The general limitation imposed on user maintenance of signal equipment is that the user may do anything that does not require removal of the equipment from its case.

(3) Second-echelon maintenance is that maintenance performed by specially trained personnel in the using organization that is beyond the capabilities and facilities of the first echelon. In armor organizations, radio and radar mechanics who perform second-echelon maintenance are assigned down to company level. These mechanics perform periodic inspections and lubrication of organic signal equipment and replace pluckout parts or subassem-

blies. Their activities constitute the vital second half of organizational maintenance and assist the user in keeping equipment operational. These mechanics perform maintenance on signal equipment as limited by tools, test equipment, repair parts, facilities, time, and training.

c. Field Maintenance. In the armored division, field maintenance of signal equipment is performed by signal personnel of the division signal battalion. The division signal supply and maintenance section of the signal battalion headquarters and headquarters company, plus the forward repair sections of the forward communication company, perform third-echelon maintenance for the armored division (ch. 10). See also AR 750–5, AR 750–625, and FM 17–50.

179. Reports

a. General. The reports discussed in this paragraph pertain to signal logistics only. Other reports required are in accordance with unit SOP.

b. Periodic Reports. Accomplishment of preventive maintenance in an orderly and controlled fashion is facilitated by the use of appropriate DA checklists. These checklists reports are prepared for all signal equipment. They are for use during both first- and second-echelon maintenance. The user completes appropriate parts of the form as he accomplishes preventive maintenance on the equipment, and the radio mechanic further completes the maintenance form as he performs the periodic preventive maintenance check. These records bcome part of the organizational maintenance file maintained by the communication chief.

c. Inspection Reports. Inspection reports are made upon completion of command maintenance or technical inspections. These reports reflect the state of operational readiness of signal equipment of the unit. They serve as a basis for grading unit efficiency and preventing untimely breakdowns.

d. Equipment Status Reports. Equipment status reports are submitted periodically as required. During combat actions, these reports may be submitted daily to reflect the current operational status of all signal equipment in a unit. They are used primarily for communication planning at higher levels.

e. Daily Battle Loss Equipment Report. The daily battle loss equipment report is used by armor units as the means for reporting loss of major items of equipment during combat actions. Loss of complete signal items is reported by this means through the unit logistical officer. When authorized by the field army, it serves as an automatic requisition. A battle loss is reported only once, and the report goes to the DLCC for distribution to the signal battalion.

f. Unsatisfactory Equipment Reports (UER). Unsatisfactory equipment reports are used to report repetitive troubles requiring corrective action by a technical service. For signal equipment, these reports provide for prompt modification action and a source of technical data for study. Any unit or organization where the unsatisfactory condition is detected should promptly submit the required report to the division signal officer.

g. Special Reports. Often special reports pertaining to personnel MOS utilization and to equipment operation are required by higher headquarters. These reports may be required from all units or from only designated units employing the equipment or personnel of interest. The reports provide data of value for plans and policies and must be accurate and on time.

180. Records

The communication chief in unit communication platoons keeps necessary records on signal equipment. From these records, reports and maintenance schedules are facilitated. Files of records should be as simple and concise as possible consistent with requirements of higher headquarters.

Section III. SIGNAL ORDERS AND INSTRUCTIONS

181. Signal Operation Instructions

a. Signal operation instructions (SOI) are a type of combat order issued for the technical control and coordination of communication within a command. They include sections (items) covering codes and ciphers, radio call signs and frequencies, telephone directory lists, and sound and visual meanings. The division signal officer prepares a complete SOI in conformance with publications of higher headquarters, while units below division level prepare required extracts from the division SOI. With the complete SOI the division signal officer prepares also an index that indicates items in the SOI that are current.

b. SOI extracts are complete items or portions of items of the SOI. They contain sufficient information for communication in required radio nets. This information normally includes FM radio call signs and frequencies and map, numeral, brevity, panel, and pyrotechnic codes. Radio suffixes may be included when required. Extracts are normally prepared in pocket-size editions, for ease of handling, and issued to radio users on a need-to-know basis. The classification of SOI extracts is the same as the highest classification of the items from which the information is extracted.

182. Standing Signal Instructions

a. Standing signal instructions (SSI) contains items of operational data not subject to frequent change, and instructions for the use of the SOI. They are prepared by the division signal officer, who may issue them in a separate publication or as a section of the SOI.

b. FM 11–16 covers preparation of both SOI's and SSI's in detail.

183. Standing Operating Procedure

a. The division communication standing operating procedure (SOP) is prepared by the division signal officer for the approval of the division commander, and is based on the SOP of higher headquarters. Communication portions of SOP's for all divisional and other armor units are based on the division or other higher unit SOP respectively and are prepared by unit communication officers for the approval of their commanders.

b. For details on the perparation of SOP's, see FM 11–16, FM 17–100, and FM 101–5.

184. Paragraph 5 of Operation Order

Paragraph 5 of an operation order contains orders and information relative to communication and command posts. The signal/communication officer assists in preparation of this paragraph. Contents of paragraph 5 vary with the size of the command, the flexibility of the standing operating procedure, and the situation. As a minimum, paragraph 5 contains the location of the initial command post of the issuing unit and the index to the SOI in effect.

185. FM Frequency Assignment

a. Because of the dependence of armor at all levels on FM radio, frequency assignment in armor units is extremely important. In the armored division, frequency assignment is controlled by the division signal officer.

b. In the assignment of frequencies some of the more important factors to be considered are:

(1) Number of nets in which one frequency is assigned and not duplicated in other nets.

(2) Reliability of each frequency as pertains to interference in a general area of operation.

(3) Probable task organization of units to which frequencies are assigned, and area of operation.

(4) Effect of enemy electronic activity.

(5) Requirements for alternate frequencies and for retransmission frequencies.

(6) Limitation of certain frequencies because of equipment characteristics.

APPENDIX I

REFERENCES

1. Field Manuals

FM 1–5	Army Aviation; Organizations and Employment.
FM 1–100	Army Aviation.
FM 5–134	Armored Division Engineer Battalion.
FM 6–20	Artillery Tactics and Techniques.
FM 7–24	Communication in Infantry and Airborne Divisions.
FM 11–10	The Signal Battalion, Infantry Division.
FM 11–11	The Signal Battalion, Armored Division.
FM 11–16	Signal Order, Records, and Reports.
FM 11–17	Tactical Communications Center Operation.
FM 17–1	Armor Operations, Small Units.
FM 17–20	Armored Infantry Units: Platoon, Company, and Battalion.
FM 17–33	Tank Units: Platoon, Company, and Battalion.
FM 17–34	Amphibious Tank and Tractor Battalion.
FM 17–35	Armored Cavalry Platoon, Troop, and Squadron.
FM 17–50	Armor Logistics.
FM 17–95	Armored Cavalry Regiment.
FM 17–100	The Armored Division and Combat Command.
FM 21–5	Military Training.
FM 21–6	Techniques of Military Instruction.
FM 21–30	Military Symbols.
FM 21–60	Visual Signals.
FM 24–18	Field Radio Techniques.
FM 24–20	Field Wire and Field Cable Techniques.
FM 24–150	Electronic Warfare (U).
FM 31–25	Desert Operations.
FM 31–70	Basic Cold Weather Manual.
FM 72–20	Jungle Operations.
FM 100–1	Doctrine Guidance (U).
FM 100–5	Field Service Regulations; Operations.
FM 101–5	Staff Officers' Field Manual; Staff Organization and Procedure.

2. Regulations

AR 320–5	Dictionary of United States Army Terms.
AR 320–50	Authorized Abbreviations and Brevity Codes.
AR 611–201	Manual of Enlisted Military Occupational Specialties.
AR 730–30	Supply Support of Oversea Organizations and Field Maintenance.
AR 750–1	Concept of Maintenance.
AR 750–5	Maintenance Responsibilities and Shop Operation.
AR 750–625	Maintenance Inspections and Reports, Signal Equipment.

3. Miscellaneous

DA Pam 108–1	Index of Army Motion Pictures, Filmstrips, Slides, and Phono-Recordings.
DA Pam 310 series	Military Publication (Indexes).
ASubjScd 11–050	Radio Operators, Low and Intermediate Speed (MOS 050 and 051).
ASubjScd 11–310	Field Communication Crewman (MOS 310).
ASubjScd 11–723	Teletypewriter Operator (MOS 723).
SIG SM 7 & 8 series	Organizational Maintenance Allowances and Field and Depot Maintenance Stockage Guide (Including Fixed Plant Maintenance List).

APPENDIX II

ARMOR WIRE SYSTEMS

Figures 35 through 40 show representative armor organization wire systems, including major capabilities furnished at key signal and message centers. For technical details, see FM 11–11 and FM 24–20.

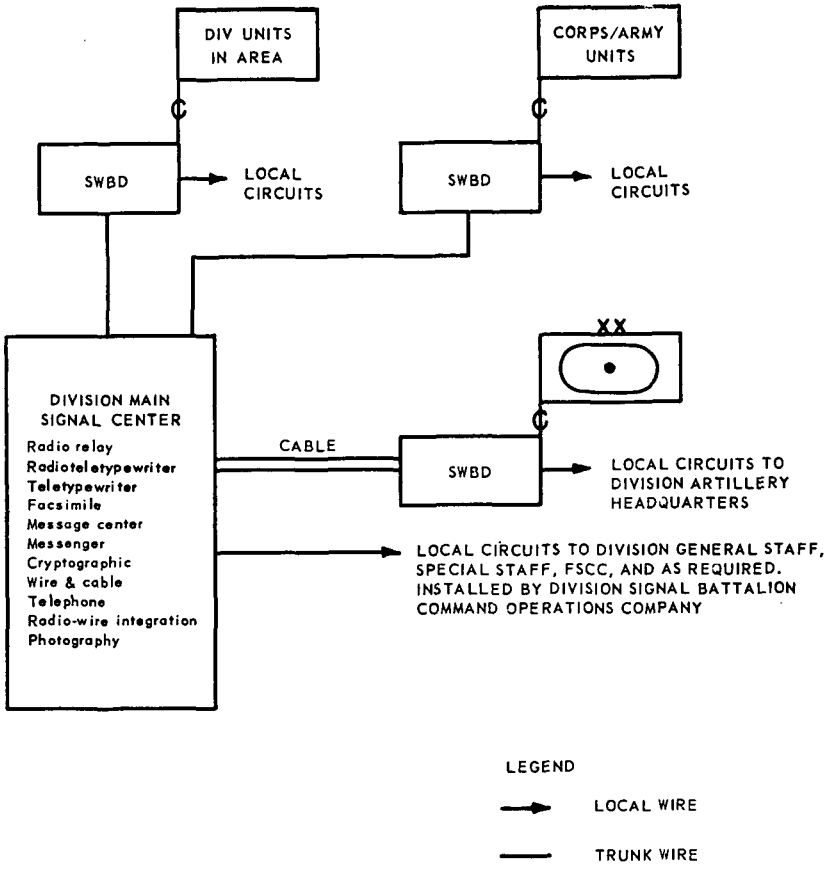


Figure 35. Internal armored division headquarters wire communication network.

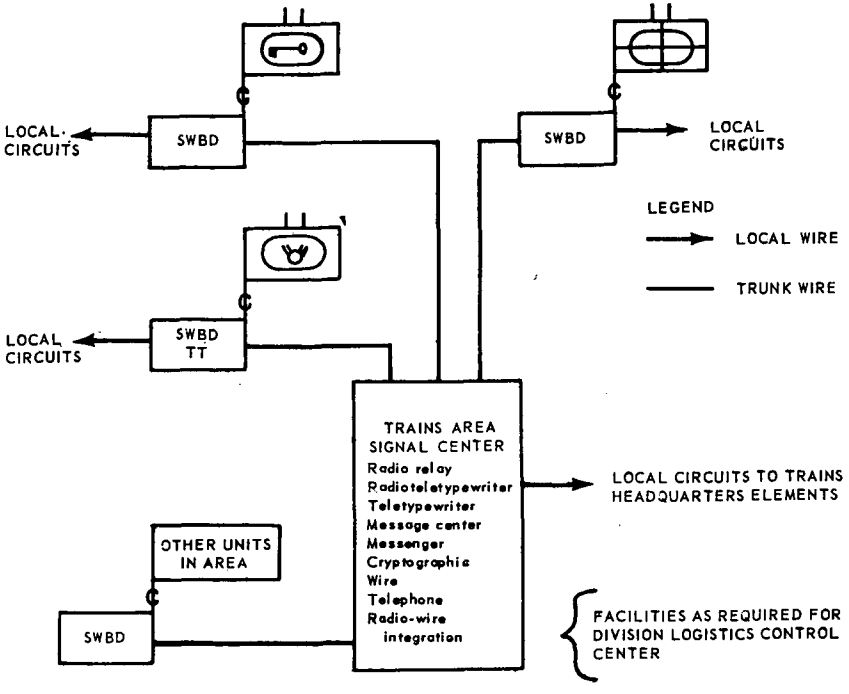


Figure 36. Internal armored division trains wire communication network.

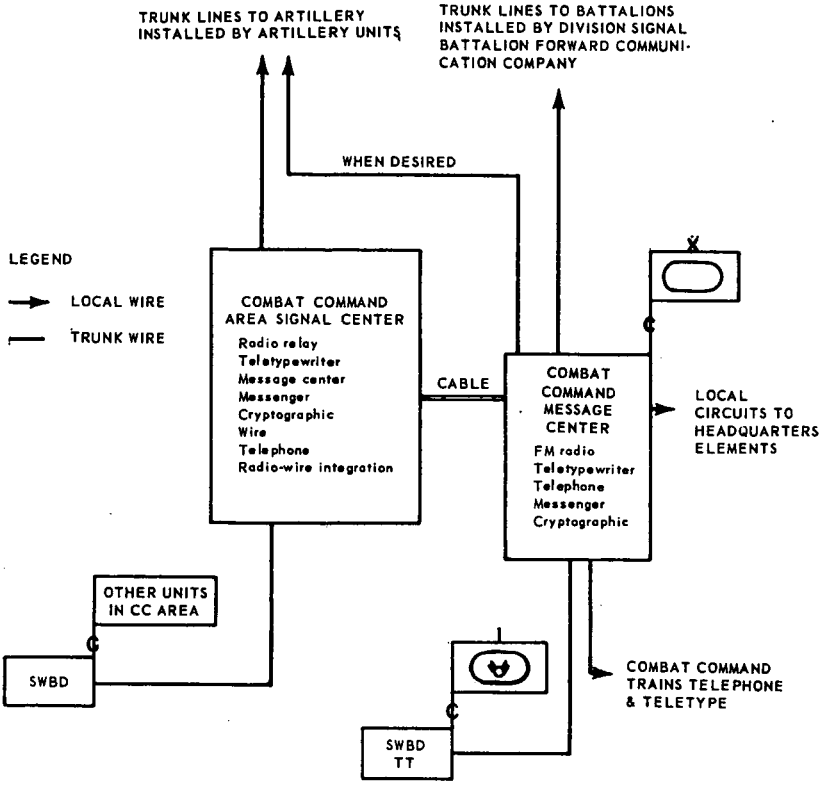


Figure 37. Internal combat command wire communication network.

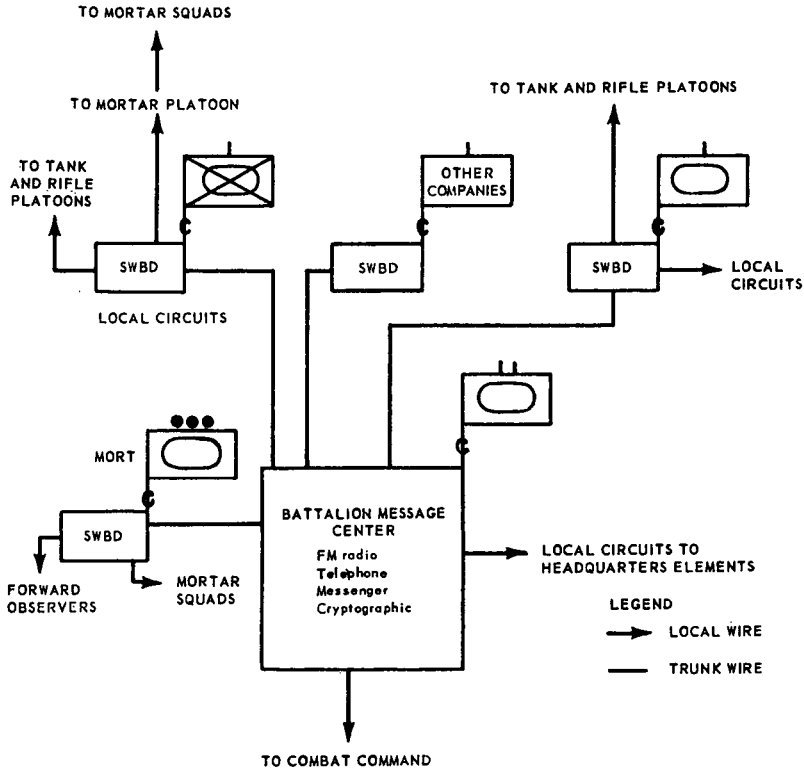


Figure 38. Internal armored division battalion task force wire communication network.

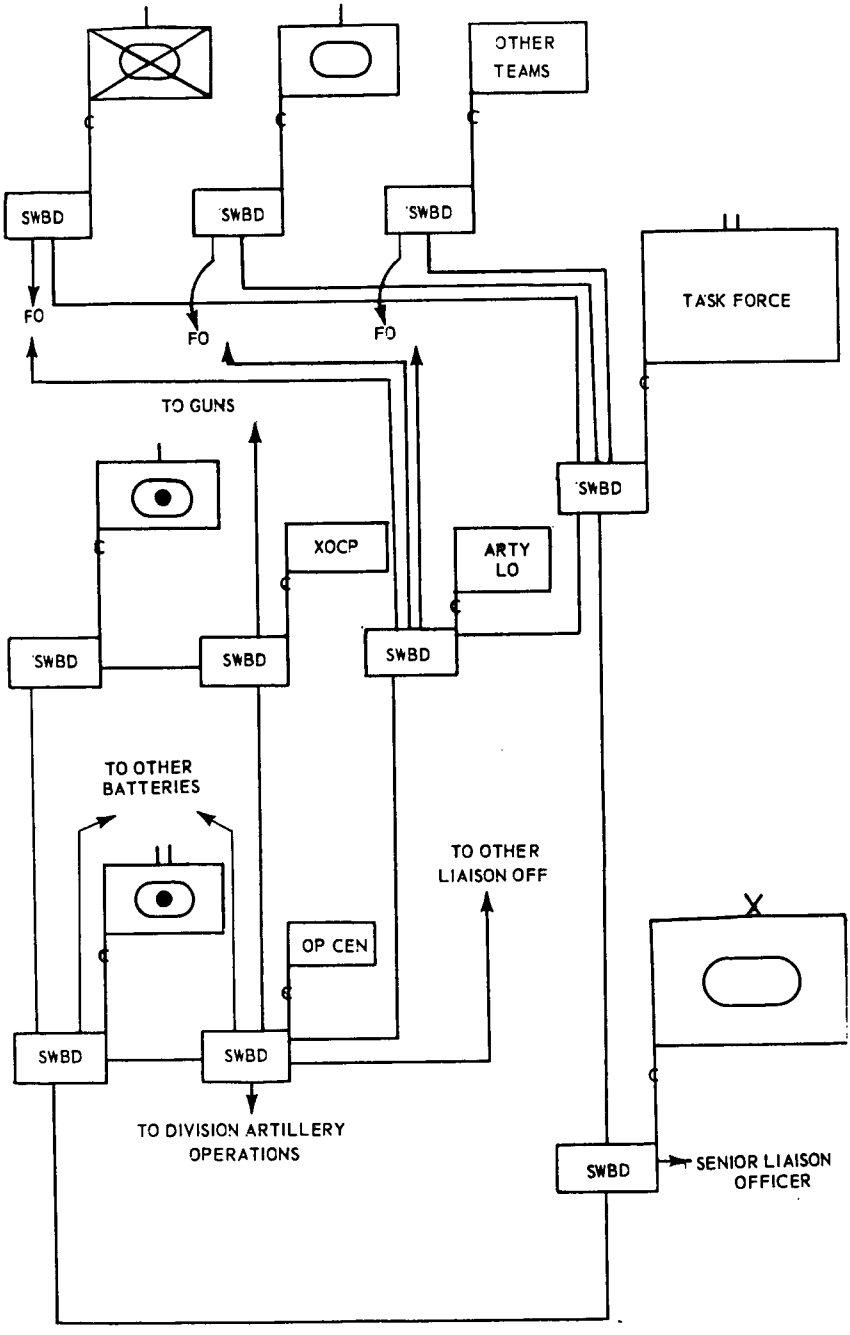
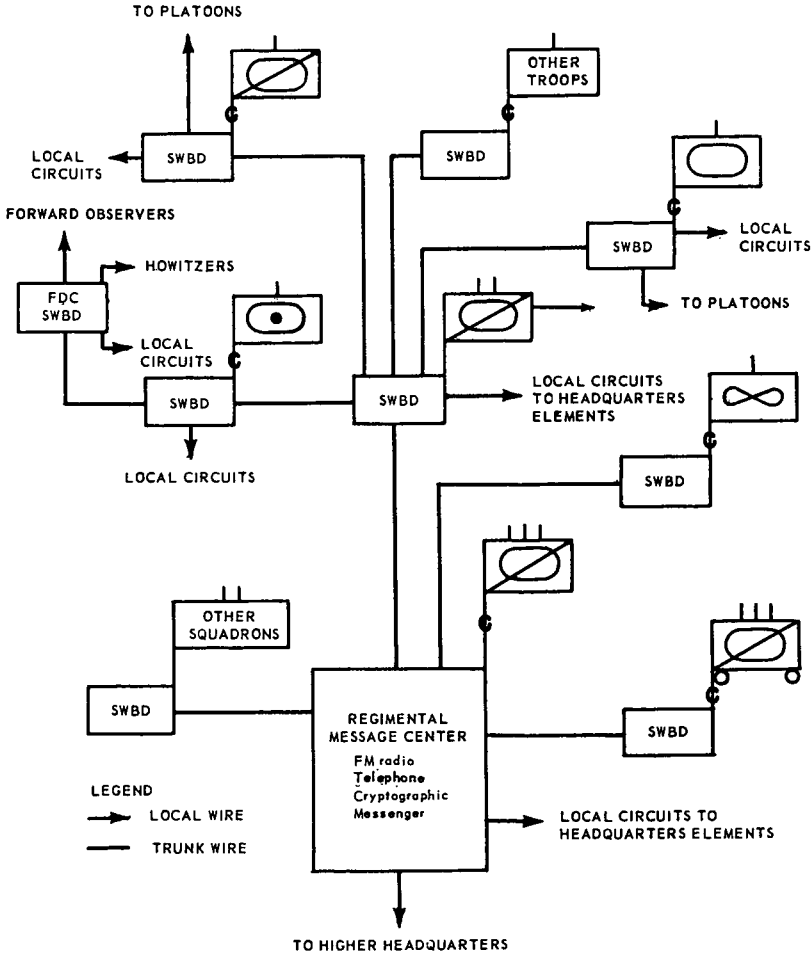


Figure 39. Internal direct support artillery wire communication network.



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Units org under fol TOE: (1	10–48
copies each except as indicated)	11–55 (2)
1–17 (2)	11–56
5–215	11–57
5–216	11–58
5–217	12–27
5–218	19–29

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.

USAR: USAR Sch (10); units—same as Active Army.

For explanation of abbreviations used, see AR 320–50.

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